

# Homework 1 - Risk Management

```
clc
clear all
close all
perc_cover = [0,0.25,0.5,0.75,1];
perc_forward = [0,0.25,0.5,0.75,1];
change = [1.01,1.22,1.48];
volume = [10000,25000,30000];
K = 1.22;

%la politica è stabile su 25000 studenti
volume_policy = 25000;
```

```
format bank
impact = hedging_policies(perc_cover, perc_forward, change, volume, volume_policy, K);
%print impact di un caso particolare
%impact()
minMatrix = squeeze(min(min(impact,[],1),[],3));
disp(array2table(minMatrix,'VariableNames',cellstr(num2str(perc_forward')),...
                 'RowNames',cellstr(num2str(perc_cover'))));
```

	0	0.25	0.5	0.75	1
0	-7800.00	-7800.00	-7800.00	-7800.00	-7800.00
0.25	-6556.25	-6460.94	-6365.63	-6270.31	-6175.00
0.5	-5312.50	-5121.88	-4931.25	-4740.63	-4550.00
0.75	-4068.75	-3782.81	-3496.88	-3210.94	-2925.00
1	-2825.00	-2443.75	-2062.50	-2218.75	-3150.00

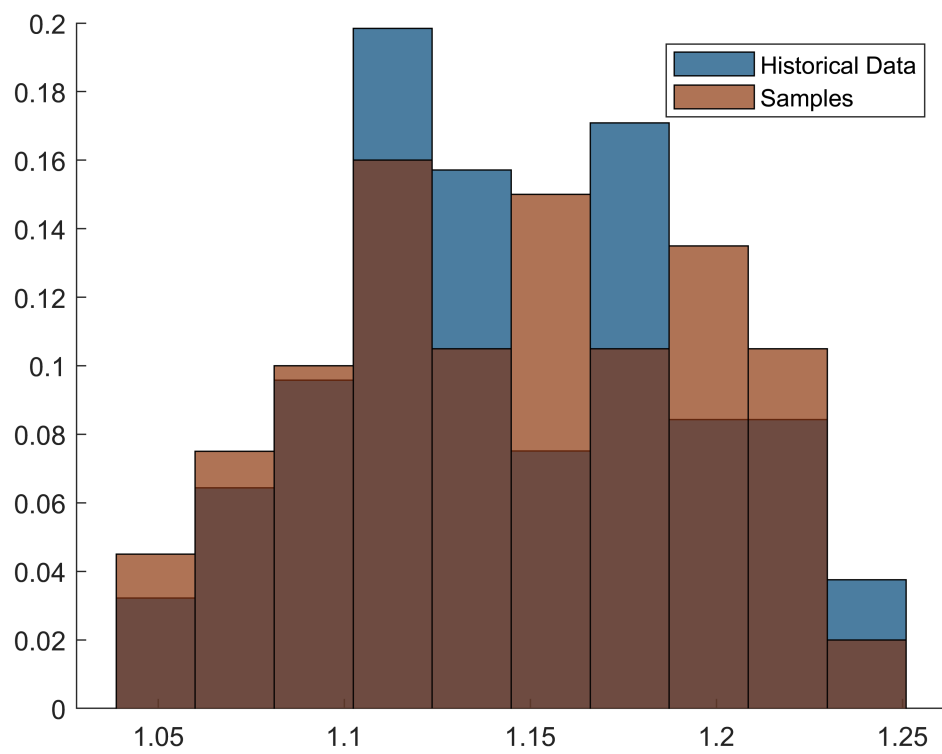
Valori bassi perché cambio irrealistico a 1.48 penalizza molto

```
maxOfMatrix(minMatrix, perc_cover, perc_forward)
```

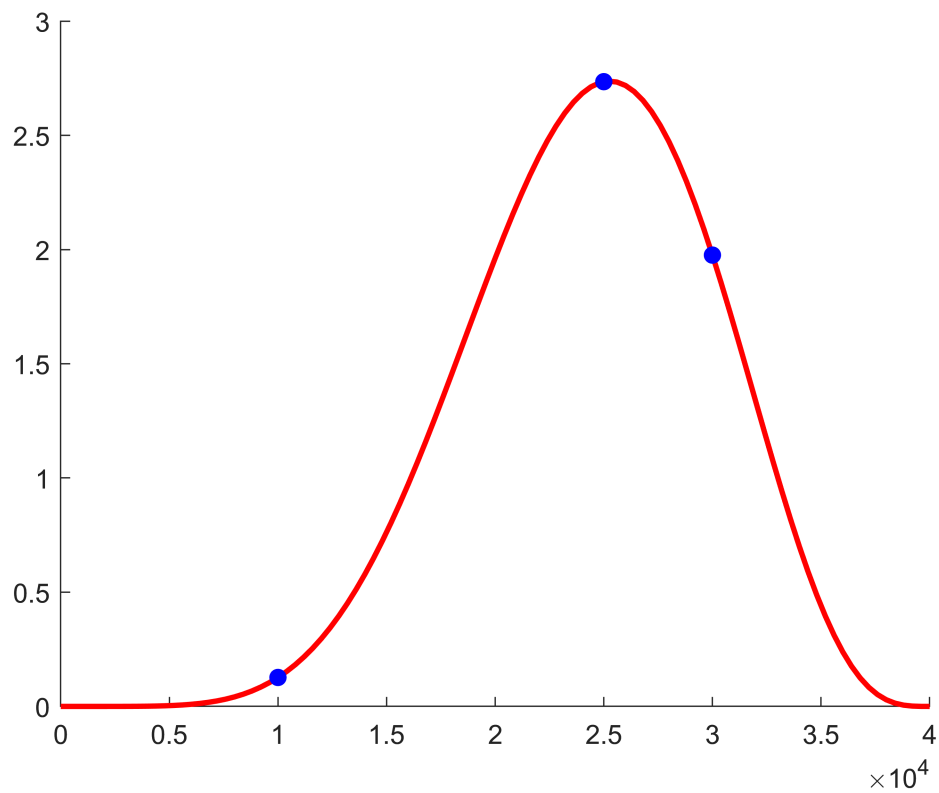
```
max: -2062.5
perc_cover: 1
perc_forward: 0.5
```

## Dati reali

```
samplesChange = samplingBetaFromData(true);
```



```
samplesVolume = samplingBetaFromParameter(7,4.5,0,40000,true,volume);
```



```

impact = hedging_policies(perc_cover, perc_forward, samplesChange, samplesVolume, volume_policy
probabilities = [0.9 0.95 0.99];

```

## Historical Simulation

```

[minMatrix, varianza, deviazione_standard, VaR, CVar]=RiskMeasures(probabilities, impact, 'Hist
squeeze(VaR(3, :, :))

```

```

ans = 5x5
    -381.92    -381.92    -381.92    -381.92    -381.92
    -664.62    -569.31    -474.00    -378.68    -283.37
    -953.55    -762.92    -572.30    -381.67    -243.70
    -1249.41    -963.47    -677.53    -536.43    -752.81
    -1553.77    -1172.52    -890.75    -1134.06    -1596.43

```

```

maxOfMatrix(squeeze(VaR(3, :, :)), perc_cover, perc_forward)

```

```

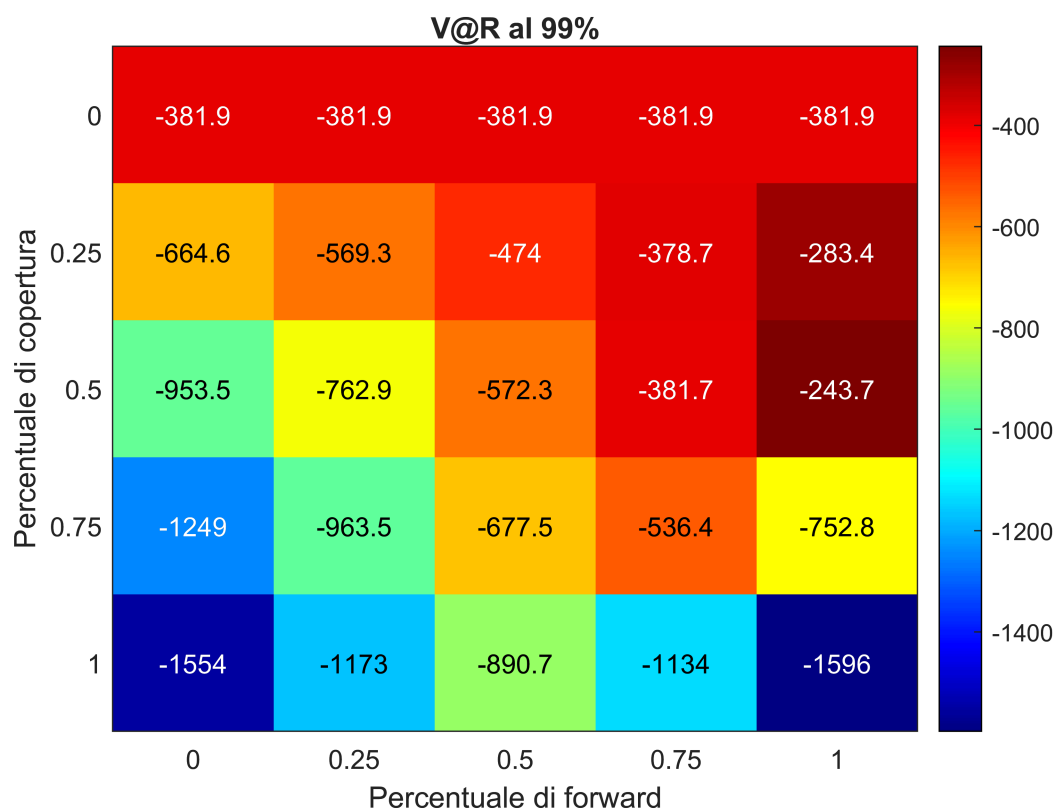
max: -243.6988
perc_cover: 0.5
perc_forward: 1

```

```

heatmap(perc_cover, perc_forward, squeeze(VaR(3, :, :)), 'Title', 'V@R al 99%', ...
'XLabel', 'Percentuale di forward', 'YLabel', 'Percentuale di copertura', ...
'GridVisible', 'off', 'Colormap', jet);

```



## Parametric Beta

```

[minMatrix, varianza, deviazione_standard, VaR, CVar]=RiskMeasures(probabilities, impact, 'Para
squeeze(VaR(3, :, :))

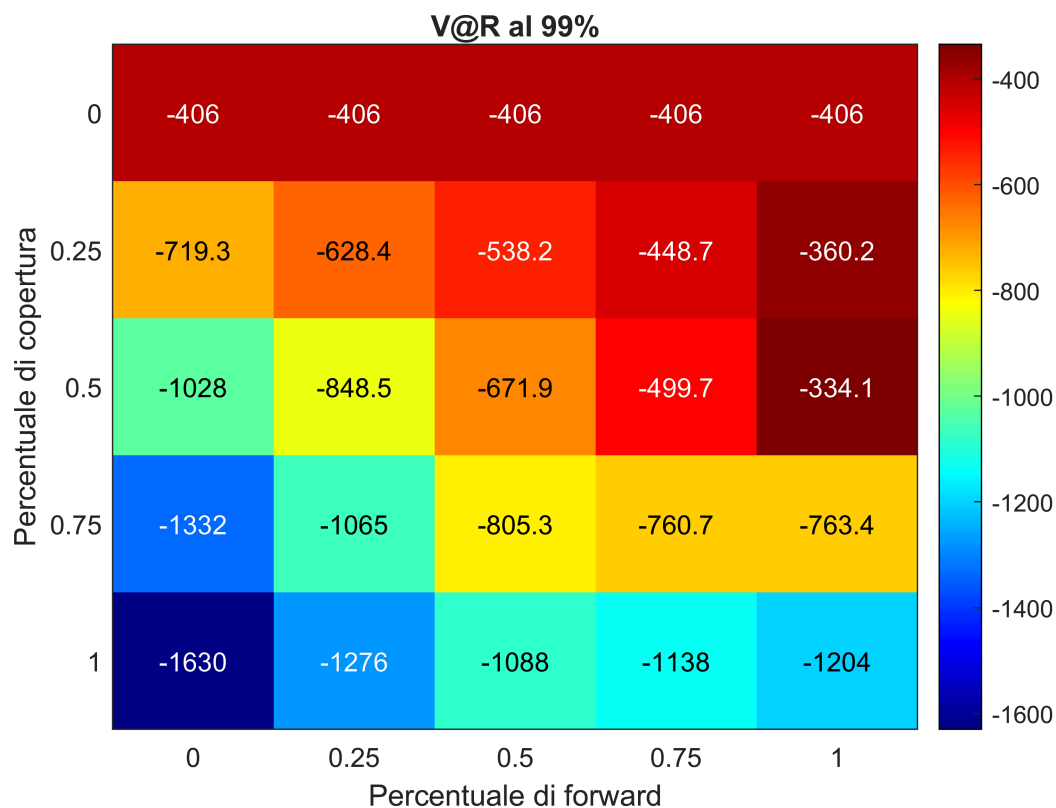
```

```
ans = 5x5
    -406.03    -406.03    -406.03    -406.03    -406.03
    -719.31    -628.43    -538.18    -448.69    -360.16
   -1028.10    -848.51    -671.89    -499.74    -334.15
   -1331.91   -1064.97    -805.32    -760.71    -763.43
   -1630.20   -1275.89   -1088.45   -1138.00   -1203.91
```

```
maxOfMatrix(squeeze(VaR(3, :, :)), perc_cover, perc_forward)
```

```
max: -334.1471
perc_cover: 0.5
perc_forward: 1
```

```
heatmap(perc_cover, perc_forward, squeeze(VaR(3, :, :)), 'Title', 'V@R al 99%', ...
        'XLabel', 'Percentuale di forward', 'YLabel', 'Percentuale di copertura', ...
        'GridVisible', 'off', 'Colormap', jet);
```



## Parametric Normal

```
[minMatrix, varianza, deviazione_standard, VaR, CVar]=RiskMeasures(probabilities, impact, 'Para
```

Normale non va bene perché le code che hanno valori irrealistici pesano troppo nel calcolo dei valori, ad esempio confrontiamo il V@R della normale parametrica in confronto a quella dei dati originali

```
squeeze(VaR(3, :, :))
```

```
ans = 5x5
   -1244.85   -1244.85   -1244.85   -1244.85   -1244.85
   -1611.15   -1468.19   -1327.09   -1188.24   -1052.08
   -1977.86   -1693.92   -1419.10   -1157.64    -916.46
```

-2344.99	-1922.56	-1525.60	-1175.91	-919.33
-2712.53	-2154.74	-1654.43	-1291.85	-1239.93

## Dati reali ma con più "politiche"

```
perc_cover = [0:0.01:1];
perc_forward = [0:0.01:1];
impact = hedging_policies(perc_cover, perc_forward, samplesChange, samplesVolume, volume_policy);
[minMatrix, varianza, deviazione_standard, VaR, CVar]=RiskMeasures(probabilities, impact, 'Histogram');
squeeze(VaR(3, :, :))
```

```
ans = 101x101
    -381.92    -381.92    -381.92    -381.92    -381.92 ...
    -392.92    -392.76    -392.61    -392.46    -392.31
    -403.36    -403.05    -402.75    -402.44    -402.14
    -413.96    -413.50    -413.04    -412.59    -412.13
    -426.00    -425.39    -424.78    -424.17    -423.56
    -437.48    -436.71    -435.95    -435.19    -434.43
    -448.44    -447.52    -446.61    -445.69    -444.78
    -459.36    -458.29    -457.22    -456.16    -455.09
    -470.86    -469.64    -468.42    -467.20    -465.98
    -482.00    -480.62    -479.25    -477.88    -476.51
    ⋮
```

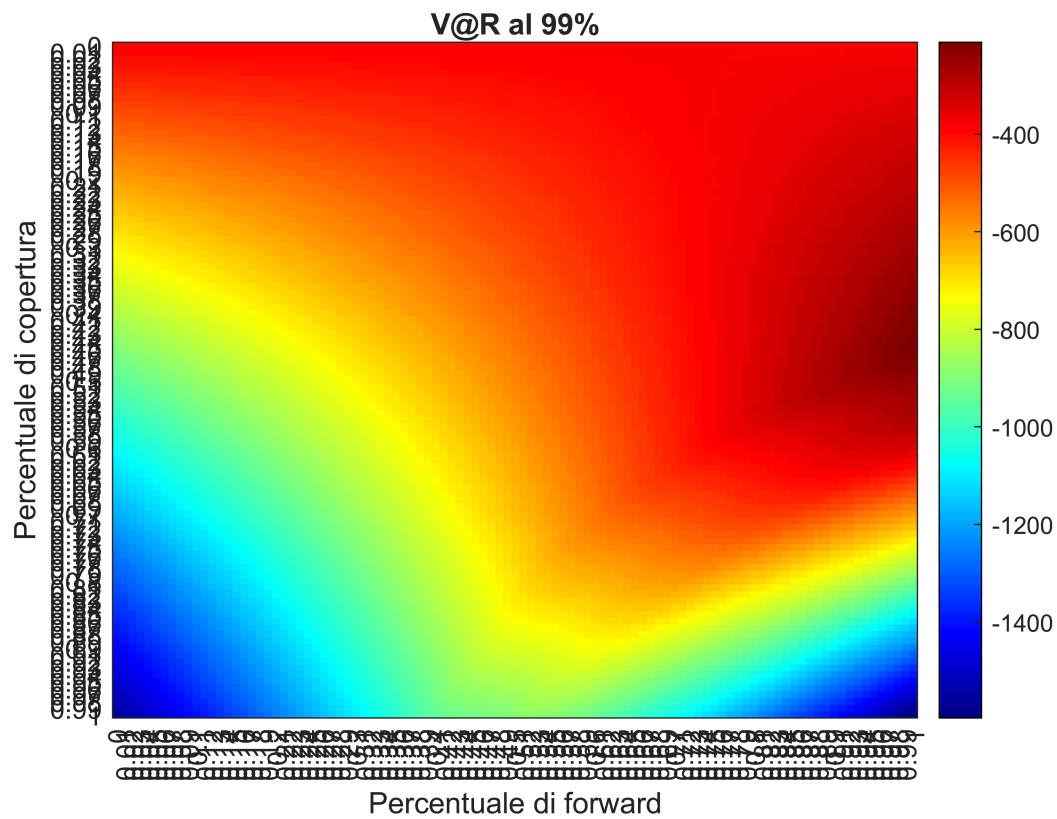
```
maxOfMatrix(squeeze(VaR(3, :, :)), perc_cover, perc_forward)
```

```
max: -211.2287
perc_cover: 0.45
perc_forward: 1
```

```
maxOfMatrix(squeeze(VaR(2, :, :)), perc_cover, perc_forward)
```

```
max: -21.7217
perc_cover: 0.4
perc_forward: 1
```

```
heatmap(perc_cover, perc_forward, squeeze(VaR(3, :, :)), 'Title', 'V@R al 99%', ...
    'XLabel', 'Percentuale di forward', 'YLabel', 'Percentuale di copertura', ...
    'GridVisible', 'off', 'Colormap', jet);
```



```
heatmap(perc_cover(1:10:101),perc_forward(1:10:101),squeeze(VaR(3,1:10:101,1:10:101)), 'Title', '
  'XLabel', 'Percentuale di forward', 'YLabel', 'Percentuale di copertura', ...
  'GridVisible', 'off', 'Colormap', jet);
```

