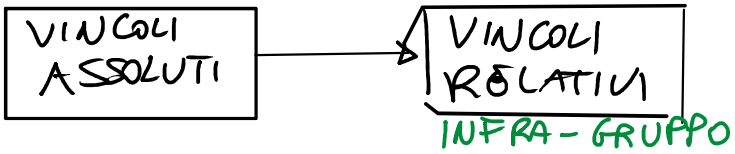
Enhancement della Tecnica Euristica basata sull'efficiente di nuovi PESI



$$\min_{w} \sigma_{PORT}$$

Vincoli

$$E(R)_{PORT} = R^*$$

$$\sum w_i = 1$$

$$w_i \geq 0 \quad \forall i \in [1, 2, 3, \dots, N]$$

Vincoli Infra-Gruppo

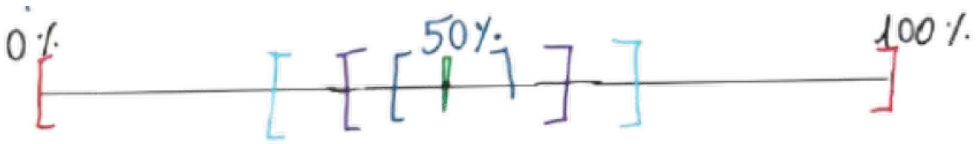
$$\frac{w_i}{\sum w_{GRUPPO}} \geq h_i$$

$$\frac{w_i}{\sum w_{GRUPPO}} \leq k_i$$

1) Definisco per tutte le asset class un hi>0 e un ki<100%

2) Definisco hi e ki in relazione ad un valore di "riferimento" (**Rif**) intorno al quale creo l'intervallo di oscillazione
3) Il Rif è il peso market neutral della asset (*home bias adjusted*)
4) Settare hi e ki creando un intervallo di oscillazione intorno alla neutralità (HBA) che è proporzionale alla fiducia riposta nella aspettativa.

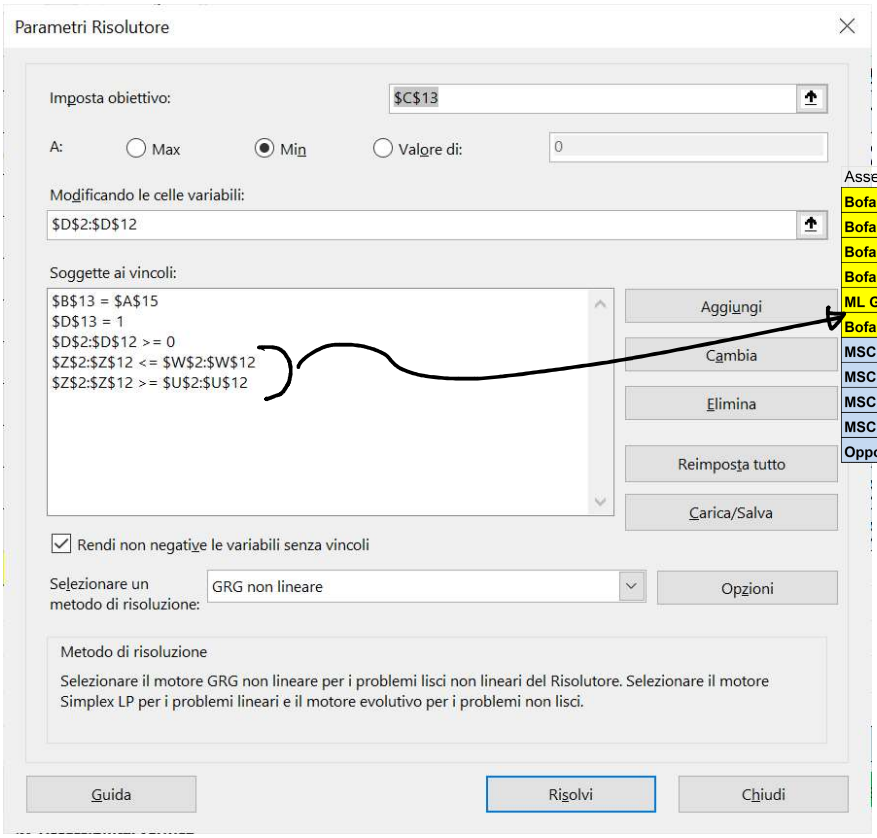
Esempio > Azionario Nord-America



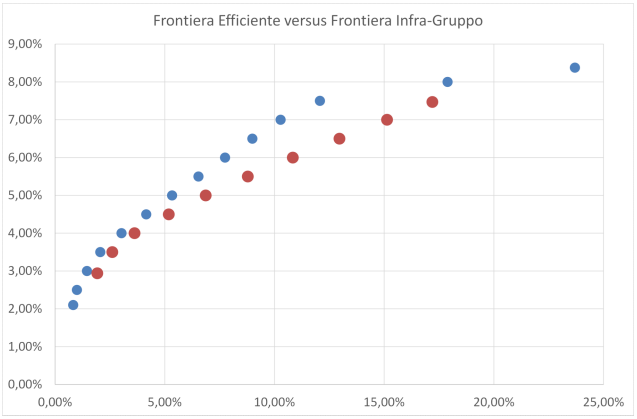
- Macchine del Tempo
- Team di Scienziati
- Fiducia BASSA
- Fiducia MEDIA
- Fiducia Alta

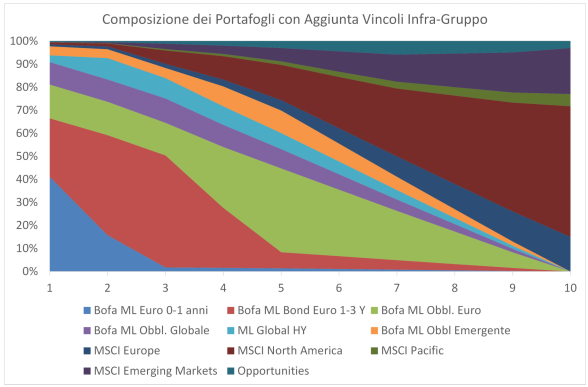
Esempio di OTTIMIZZ. con Vincoli Infragruppo

- Excel



Asset Class	*min (hi)*	MKT NEUTR (Rif.)	*MAX (ki)*
Bofa ML Euro 0-1 anni	2,0%	4,0%	45,0%
Bofa ML Bond Euro 1-3 Y	10,0%	15,0%	45,0%
Bofa ML Obbl. Euro	15,0%	45,0%	60,0%
Bofa ML Obbl. Globale	10,0%	23,0%	28,0%
ML Global HY	3,0%	5,0%	12,0%
Bofa ML Obbl Emergente	4,0%	8,0%	14,0%
MSCI Europe	18,0%	23,0%	35,0%
MSCI North America	35,0%	50,0%	60,0%
MSCI Pacific	4,0%	9,0%	15,0%
MSCI Emerging Markets	6,0%	13,0%	21,0%
Opportunities	3,0%	5,0%	15,0%

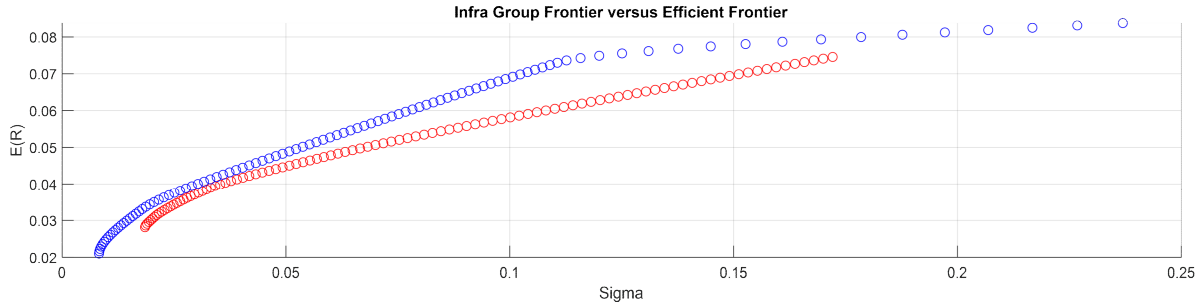


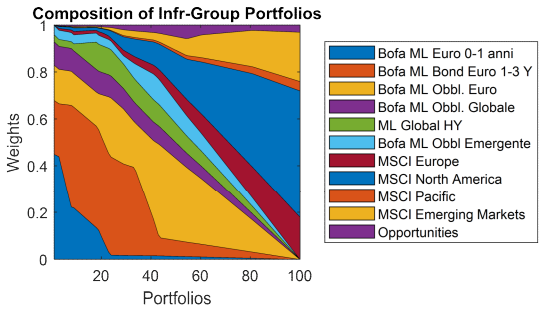


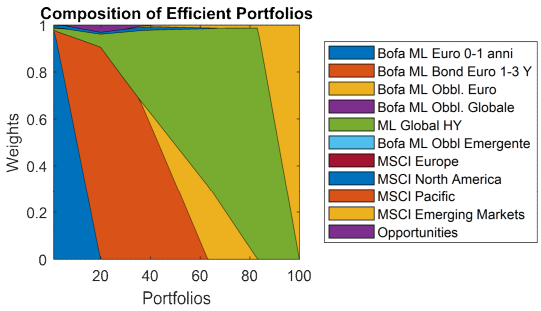
Matlab -----

```
clear
close all

%data from the excell file
[EXP_RET LABELS]=xlsread('File_excel.xlsx','Mark Infra optim','A2:B12');
COV=xlsread('File_excel.xlsx','Mark Infra optim','H2:R12');
LB1=xlsread('File_excel.xlsx','Mark Infra optim','U2:U12');
UB1=xlsread('File_excel.xlsx','Mark Infra optim','W2:W12');
%setting P and the constraints for positive weights
P=Portfolio;
P=Portfolio('AssetMean',
EXP_RET,'AssetCovar',COV,'Assetlist',LABELS,'LowerBudget', 1,
'UpperBudget', 1);
LB=-zeros(1,length(EXP_RET));
b=-eye(length(EXP_RET));
P = setInequality(P,b,LB);

POSITION = eye(length(EXP_RET))
GROUP = [1 1 1 1 1 1 0 0 0 0 0;1 1 1 1 1 1 0 0 0 0 0;1 1 1 1 1 1 0 0 0 0
0;1 1 1 1 1 1 0 0 0 0 0;1 1 1 1 1 1 0 0 0 0 0;1 1 1 1 1 1 0 0 0 0 0;0 0 0 0 0
0 1 1 1 1 1;0 0 0 0 0 0 1 1 1 1 1;0 0 0 0 0 0 1 1 1 1 1;0 0 0 0 0 0 1 1 1 1
1;0 0 0 0 0 0 1 1 1 1 1]
P = setGroupRatio(P, POSITION, GROUP, LB1, UB1);


PORT_WEIGHT=estimateFrontier(P,100)
EXP_RET_INFRA= PORT_WEIGHT'*EXP_RET;
RISK_INFRA=zeros(100,1);
for i = 1 :100
RISK_INFRA(i,1) = sqrt(PORT_WEIGHT(:,i)'*COV*PORT_WEIGHT(:,i));
end
% Altro modo di calcolare i rend att e rischi dei portafogli
[RISK_INFRA_2, EXP_RET_INFRA_2] = estimatePortMoments(P,
PORT_WEIGHT);

[RISKPORT, RETPORT, WEIGHTS]=portopt(EXP_RET,COV,100)
```

```
figure(1)
subplot(2,2,[1 2])
scatter(RISK_INFRA, EXP_RET_INFRA, 'o', 'r')
hold on
scatter(RISKPORT, RETPORT, 'o', 'b')
hold off
title('Infra Group Frontier versus Efficient Frontier')
ylabel('E(R)')
xlabel('Sigma')
grid on
subplot(2,2,3)
area(PORT_WEIGHT')
title('Composition of Infr-Group Portfolios')
ylabel('Weights')
xlabel('Portfolios')
legenda= legend(LABELS,'Location','EastOutside')
ylim([0 1]);
xlim([1 100]);
subplot(2,2,4)
area(WEIGHTS)
title('Composition of Efficient Portfolios')
ylabel('Weights')
xlabel('Portfolios')
legenda= legend(LABELS,'Location','EastOutside')
ylim([0 1]);
xlim([1 100]);
```

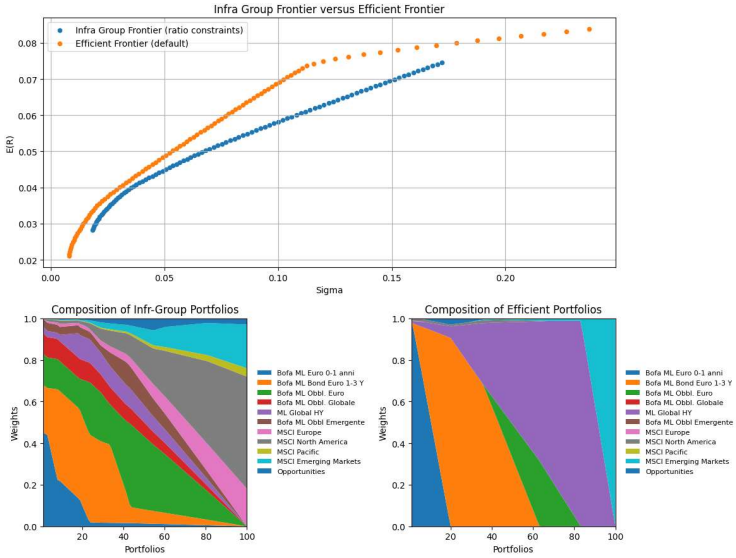






Python ----

Fiducia
Media Alta



Fiducia Nulla

Asset Class	*min*	MKT NEUTR (Rif.)	*MAX*
Bofa ML Euro 0-1 anni	4,0%	4,0%	4,0%
Bofa ML Bond Euro 1-3 Y	15,0%	15,0%	15,0%
Bofa ML Obbl. Euro	45,0%	45,0%	45,0%
Bofa ML Obbl. Globale	23,0%	23,0%	23,0%
ML Global HY	5,0%	5,0%	5,0%
Bofa ML Obbl Emergente	8,0%	8,0%	8,0%
MSCI Europe	23,0%	23,0%	23,0%
MSCI North America	50,0%	50,0%	50,0%
MSCI Pacific	9,0%	9,0%	9,0%
MSCI Emerging Markets	13,0%	13,0%	13,0%
Opportunities	5,0%	5,0%	5,0%

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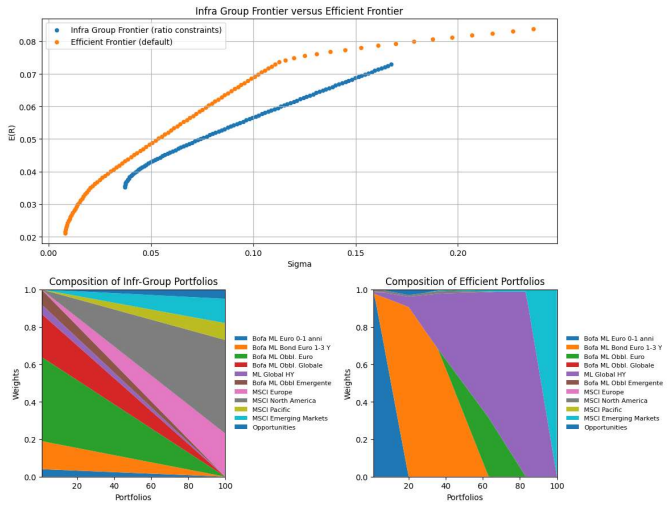
MSCI Europe	23,0%	23,0%	23,0%
MSCI North America	50,0%	50,0%	50,0%
MSCI Pacific	9,0%	9,0%	9,0%
MSCI Emerging Markets	13,0%	13,0%	13,0%
Opportunities	5,0%	5,0%	5,0%



Fiducio Tabole

Asset Class	*min*	MKT NEUTR (Rif.)	*MAX*
Bofa ML Euro 0-1 anni	0,0%	4,0%	100,0%
Bofa ML Bond Euro 1-3 Y	0,0%	15,0%	100,0%
Bofa ML Obbl. Euro	0,0%	45,0%	100,0%
Bofa ML Obbl. Globale	0,0%	23,0%	100,0%
ML Global HY	0,0%	5,0%	100,0%
Bofa ML Obbl Emergente	0,0%	8,0%	100,0%
MSCI Europe	0,0%	23,0%	100,0%
MSCI North America	0,0%	50,0%	100,0%
MSCI Pacific	0,0%	9,0%	100,0%
MSCI Emerging Markets	0,0%	13,0%	100,0%
Opportunities	0,0%	5,0%	100,0%