Massachusetts Institute of Technology

Sponsor: Electrical Engineering and Computer Science
Cosponsor: Science Engineering and Business Club
Graduate Student Council

Professional Portfolio Selection Techniques: From Markowitz to Innovative Engineering

Part 1

Antonella Sabatini* and *Monica Rossolini

in collaboration with Gino Gandolfi

MIT - Wed Jan 16, Thu Jan 17 2008,

04:00-6:00pm, 34-401

The process of portfolio construction
Asset allocation:
- strategic asset allocation
- tactical asset allocation

1st Day
January
16th

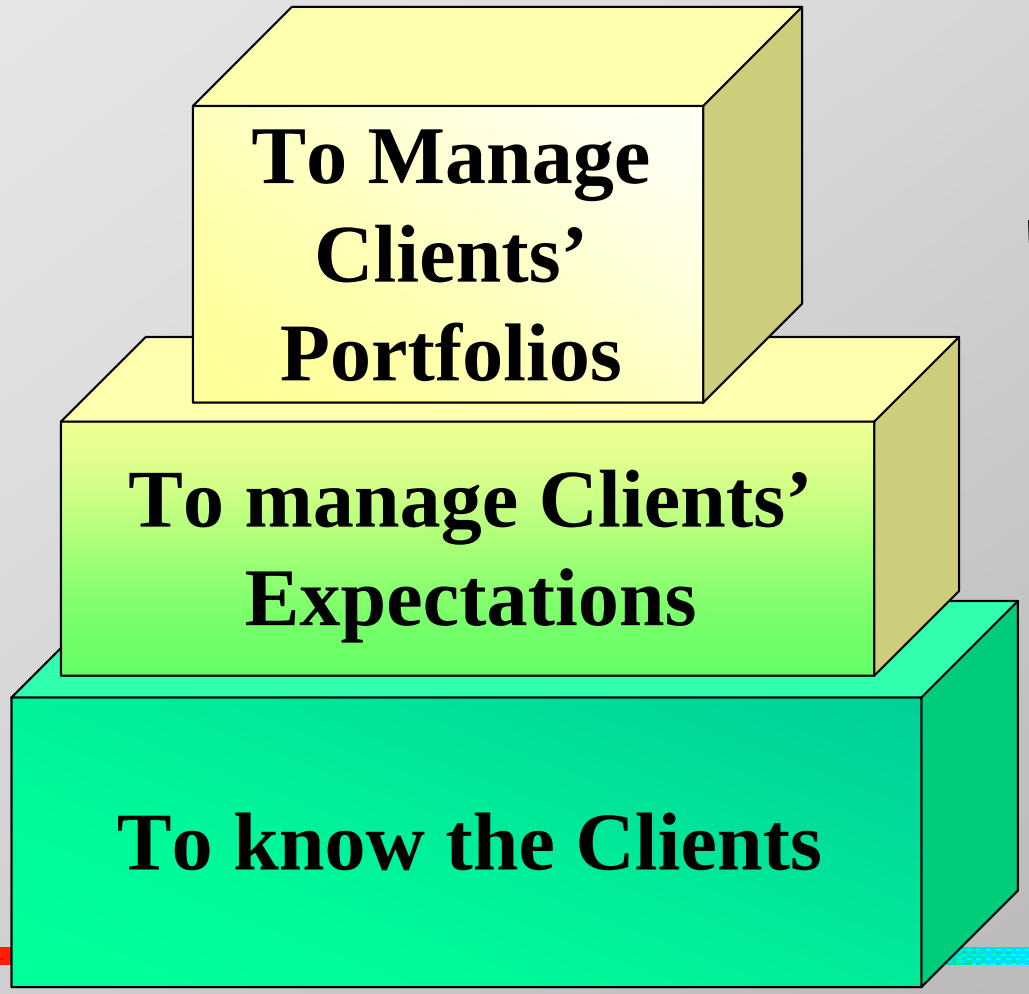
G.A.M Model:
a new tactical asset allocation technique
PID feedback controller theory
Applications and future research

2nd Day
January
17th

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

The Process of Portfolio Construction: 3 Macrophases



3rd

2nd

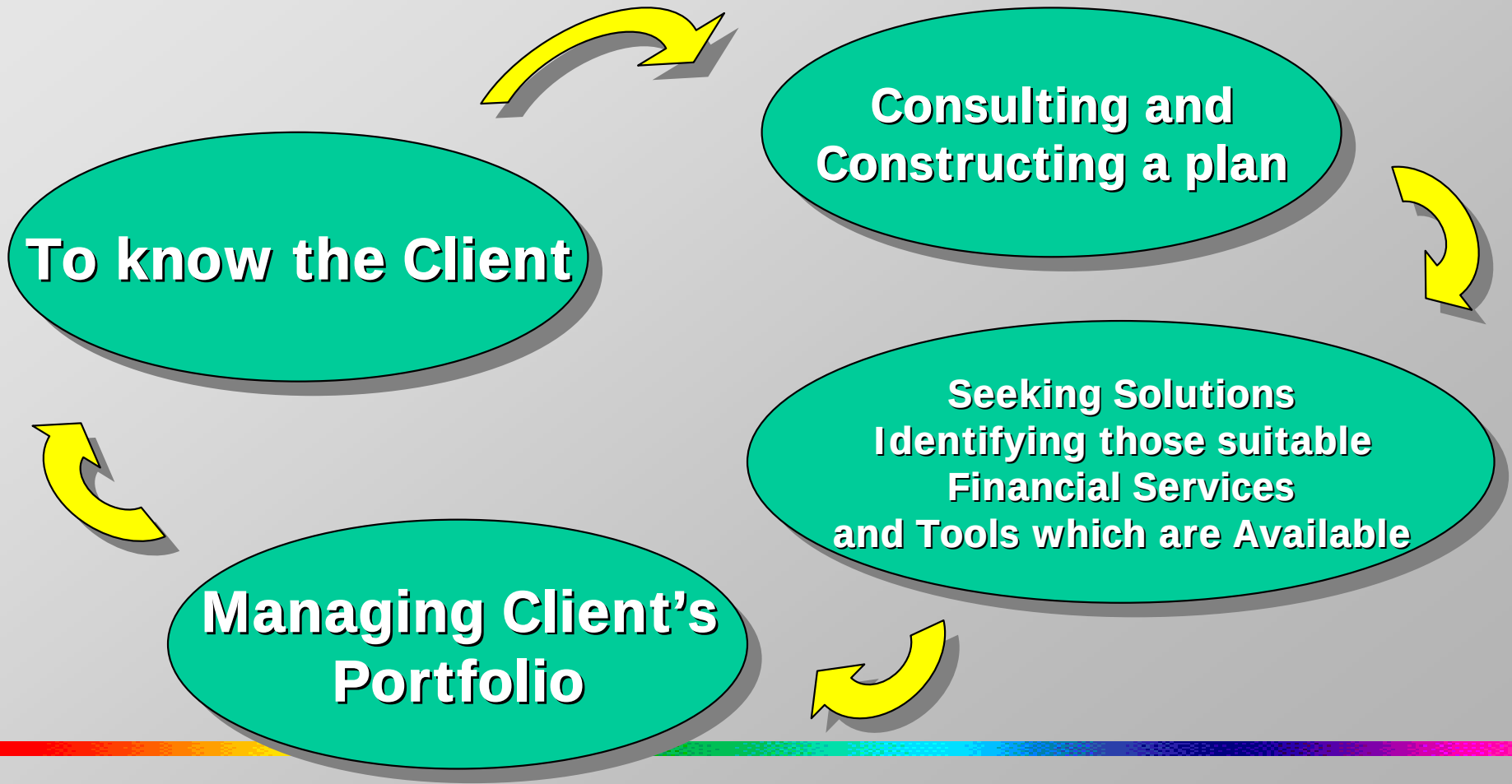
1st

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Phase 1: To know the Clients

Portfolio Manager's Skills:



Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Phase 1: To know the Clients and Analysis of Clients' Needs

Building up a Personalized and Individual Relation with the Client, Outlined in 5 Steps

Step 1

Analysis of Financial Needs and Priorities

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Phase 1: Analysis of Clients' Needs

Step 2

Identifying and Verifying Constraints

Objective Constraints:

⇩

Analysis of Client's Assets, Current Income and Future Expectations

Subjective Constraints:

⇩

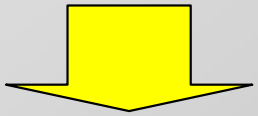
Client's Risk and Time Horizon grid

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

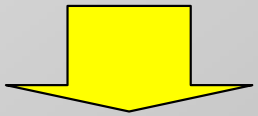
Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Phase 1: Analysis of Clients' Needs

Step 3: Presentation of Possible Solutions, given First Priorities and Needs;
Illustration of Possible Scenarios, given the Macroeconomic Situation and the Bank/Institution Policies.

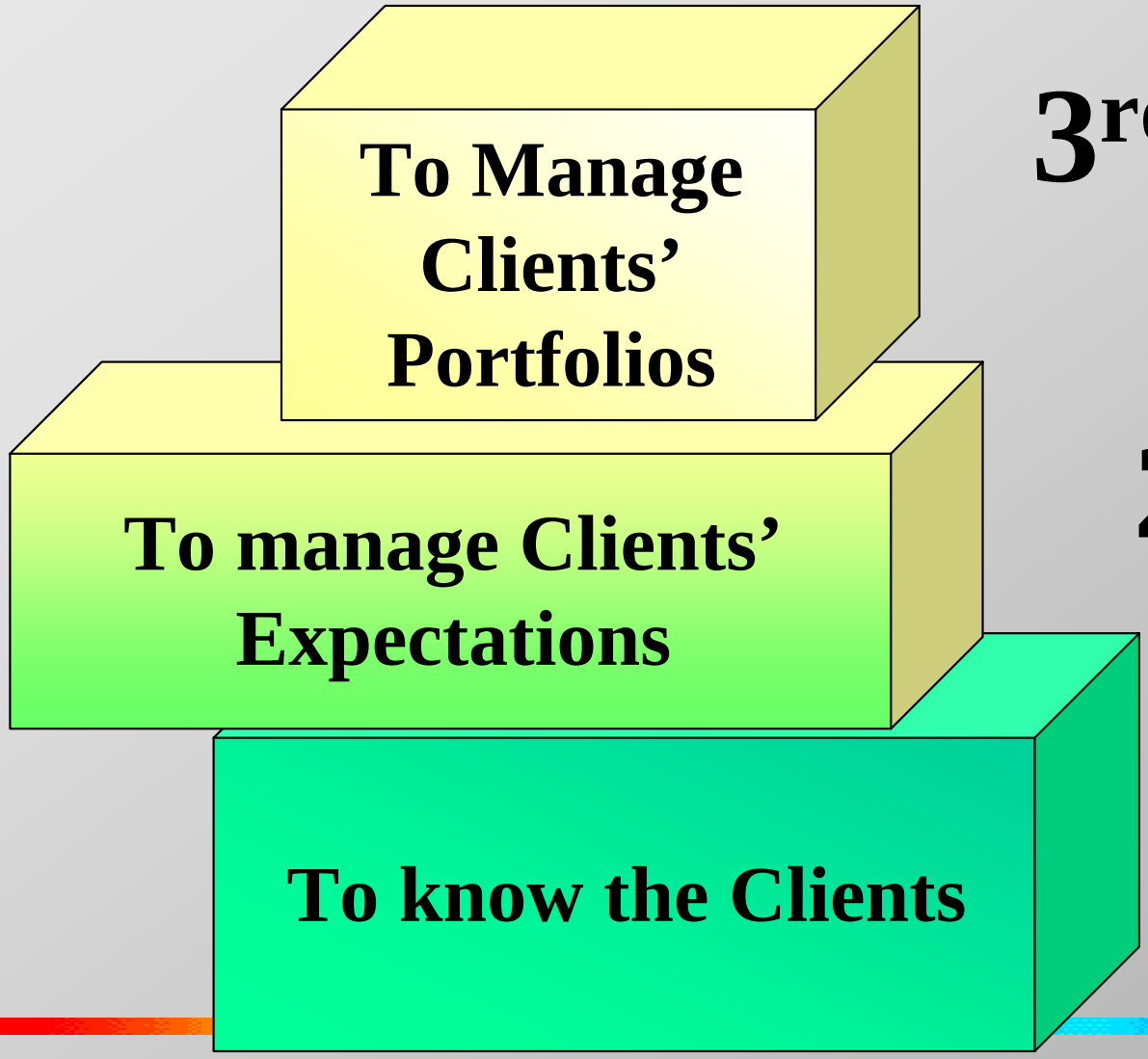


Step 4: Actuating and managing the chosen Financial Activities



Step 5: Continuous Monitoring of Client's Needs, of the chosen Financial Instruments and Investments, and Market Conditions.

The Process of Portfolio Construction: 3 Macrophases



3rd

2nd

1st

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Phase 2: To manage Clients' Expectations

Requires:

Adopting and conveying to a framework
in order to understand performance
(Time-Series of Interest,
Holding Period-Performance Relationship, etc.)

Aiming to:

- Have the Client Intuitively Understand the Trade off between Risk and Reward
- Have the Client **Aknowledge the range of the possible (attainable)** results and performance

Phase 2: To manage Clients' Expectations

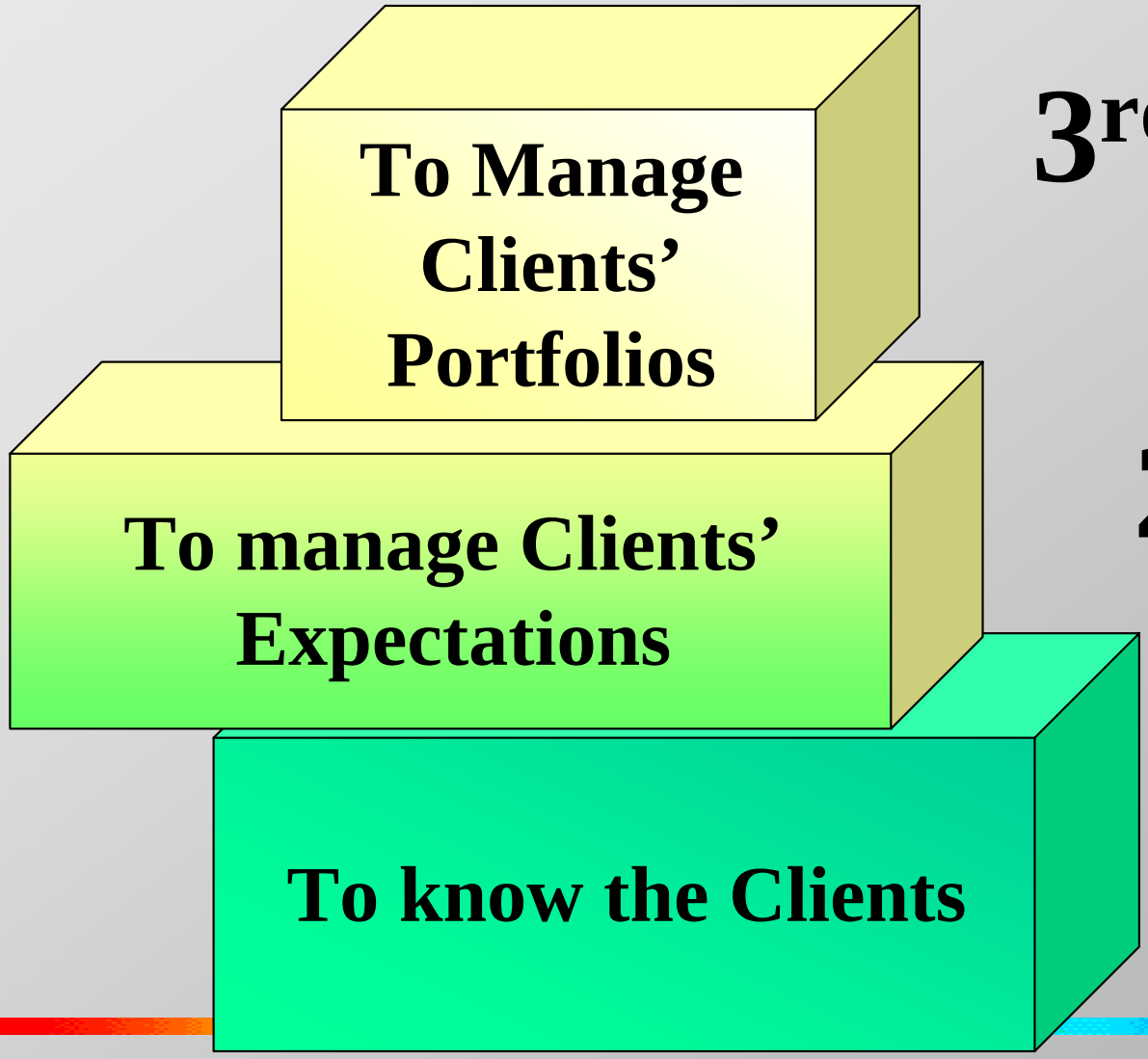
In Addition:

Sharing the Investment Philosophy And the Strategic approach

With the Purpose of:

- Defining the Risk Level implicit to all the possible managing techniques
- Improving Communication and understanding between Client and Manager, by furthering on Client's side, the dynamics and risk embedded in the specified investment management technique

The Process of Portfolio Construction: 3 Macrophases



3rd

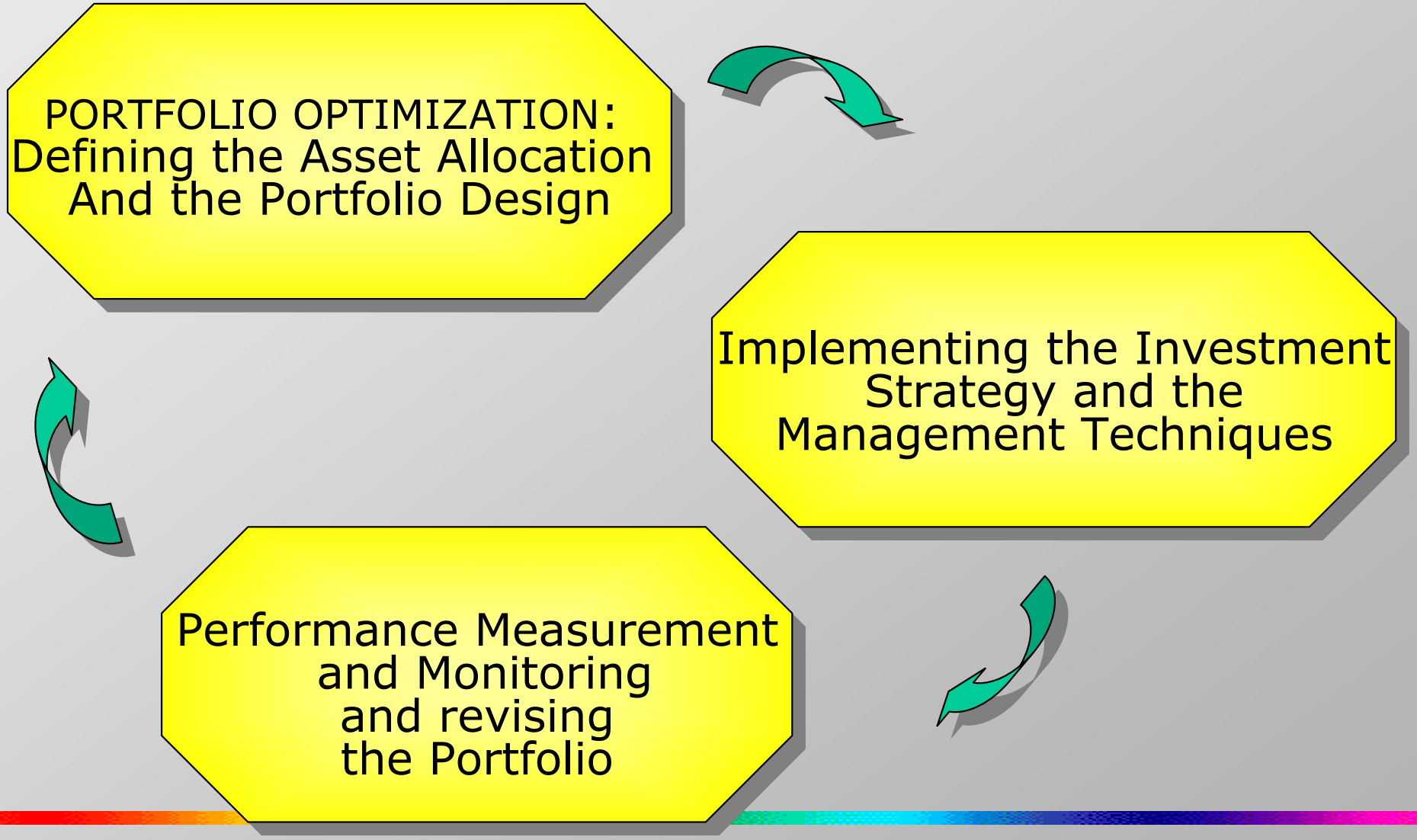
2nd

1st

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Phase 3: To Manage Clients'Portfolios



Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Asset Allocation (AA): Definition

Asset Allocation is defined as follows:

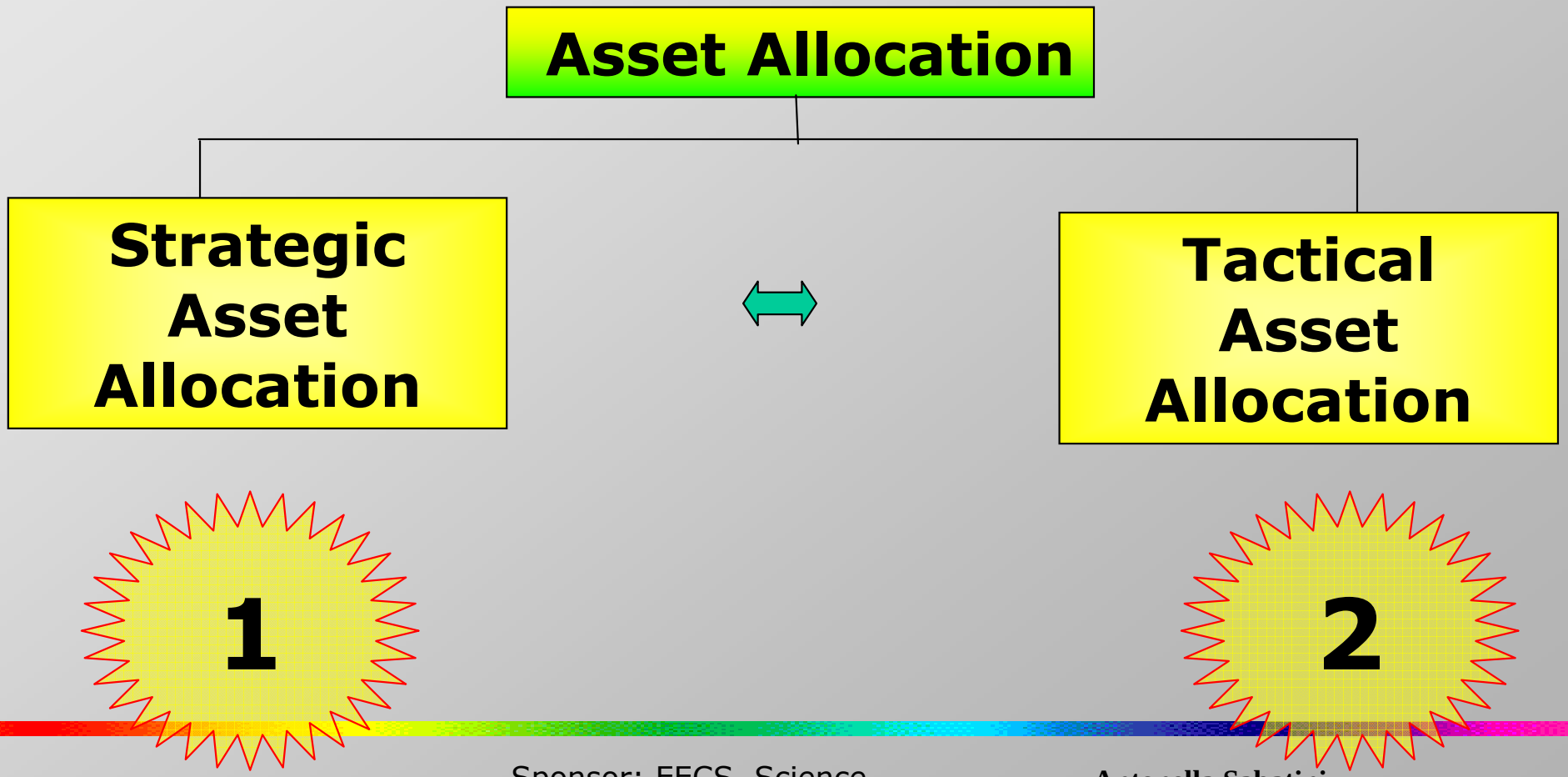
- Investment Analysis tool leading to the desired Portfolio:
- Portfolio construction is obtained through the identification of the optimal asset mix
  - –given a desired time horizon (*Holding Period*) and
  - –given investor's risk averse level

AA: Introduction

Asset Allocation focuses on and produces various elements:

- Risk Reduction through Diversification.
- Portfolio comprising those Assets presenting the best opportunity to achieve positive returns.
- Impulsive and Emotional factors Reduction

Asset Allocation

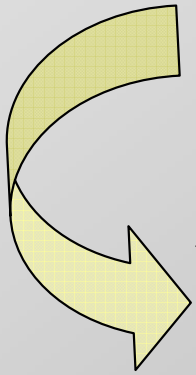


Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

1. Strategic Asset Allocation

Component of Asset Allocation, implemented by the identification of the optimal long term mix, and by monitoring results and performance on yearly intervals.



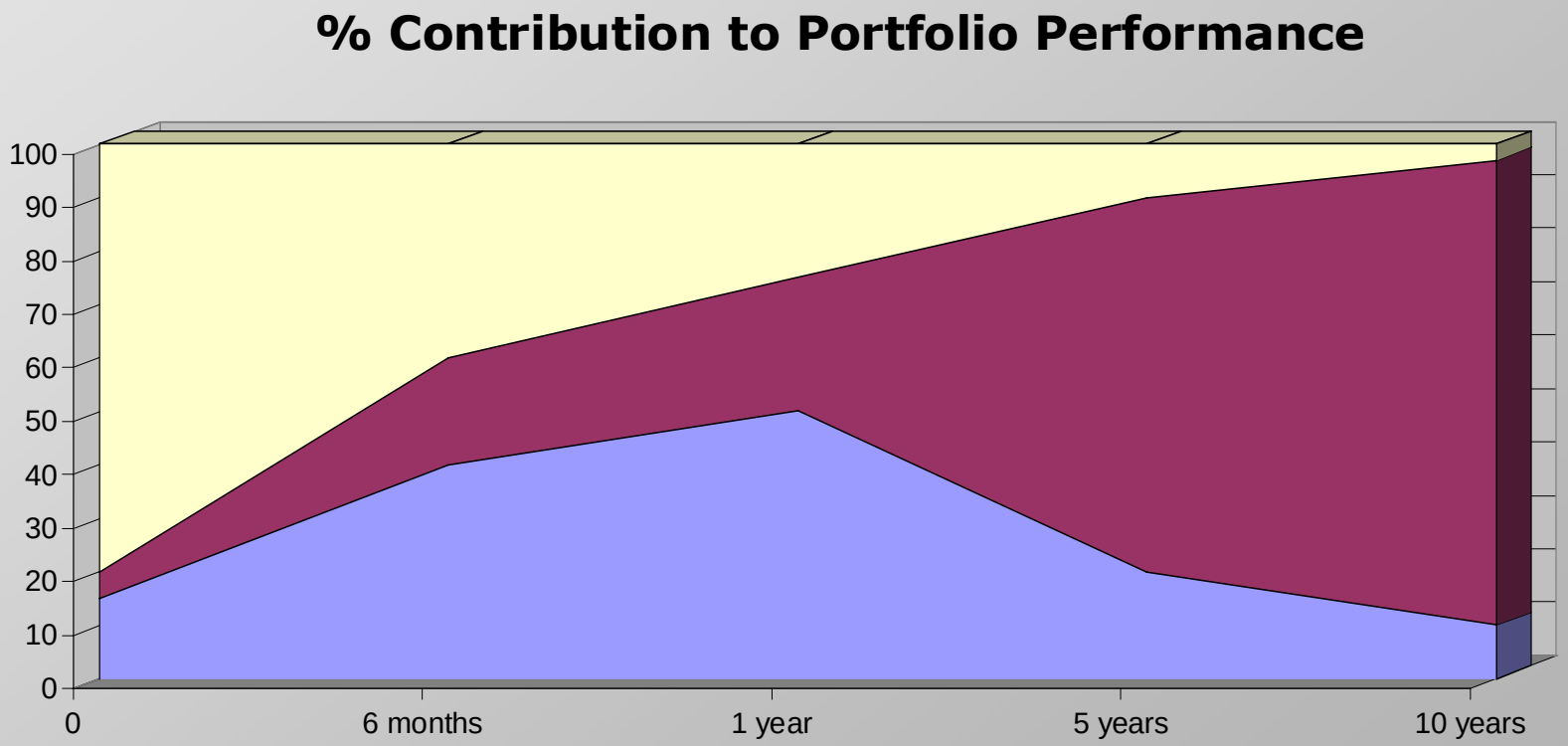
In contrast, Tactical Asset Allocation (TAA), aims to periodically take the most interesting Investment oppportunities by temporarily and partially deviating from the main strategic portfolio structure.

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

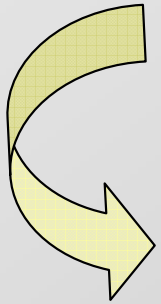
1. Strategic Asset Allocation

A study on the contributions to portfolio performance by the various determinants (*strategic, stock selection, market timing)* has estimated that the 91,5% of performance is given by strategic Asset Allocation.



1. Strategic Asset Allocation

- **The longer the investment time horizon the more is the performance contribution of the activity provided by Strategic Asset allocation.**



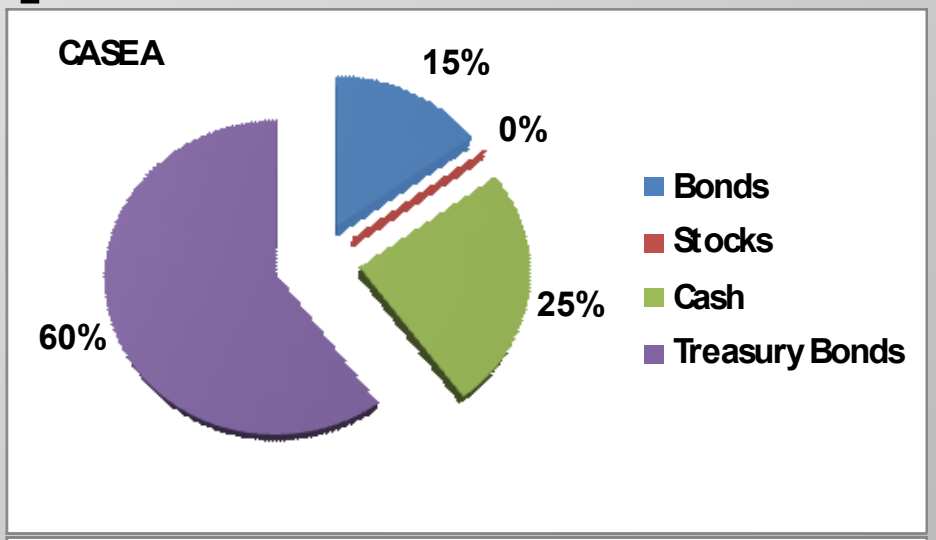
Long Term Asset Allocation is less sensitive to short term market fluctuations providing more stable returns than short term techniques.

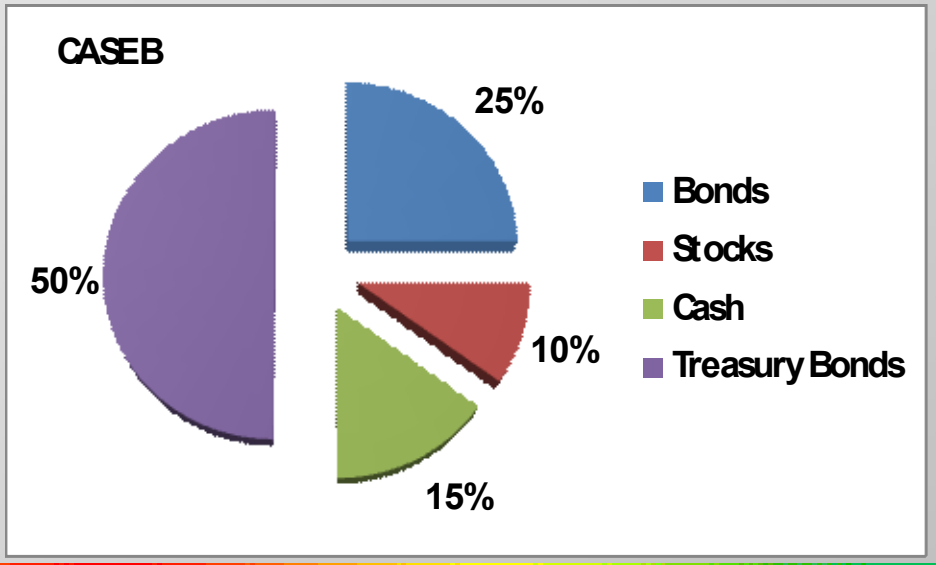
1. Strategic Asset Allocation: Exemples

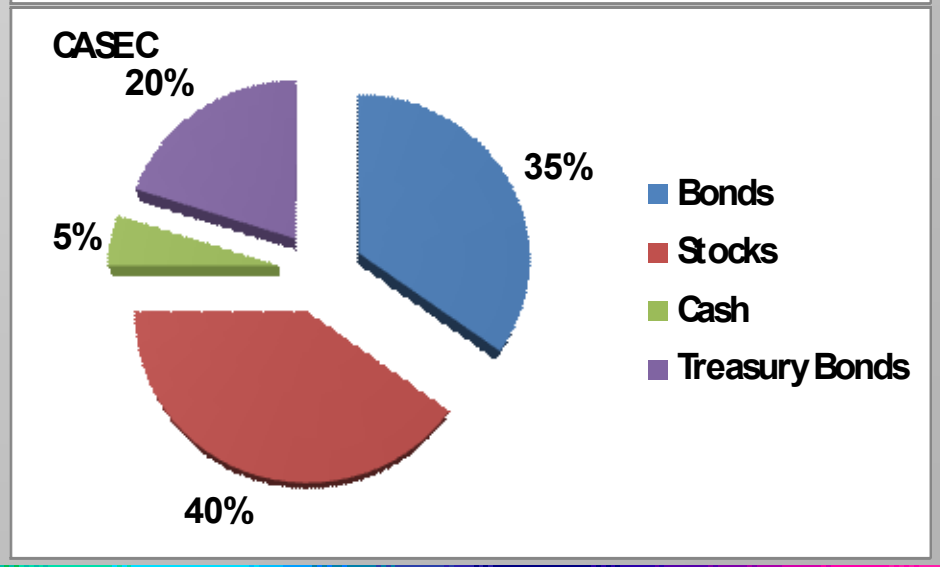
Case A:
Investor's type: *Strongly Conservative*
Level of Risk Aversion: Highest

Case B
Investor's type: *Conservative*
Level of Risk Aversion: High

Case C
Investor's type: *Aggressive*
Level of Risk Aversion: Low







The Modern Portfolio Theory

Modern Portfolio Theory (MPT) is the traditional approach to the identification of the Optimal Portfolio for investors, in terms of Risk and Expected Return.

Main studies:

Markowitz (1952) Mean-Variance principle, Efficient Frontier

Sharpe (1964)
Lintner (1965) } Capital Asset Pricing Model
Mossin (1966)

Ross (1976) Arbitrage Pricing Theory

The Relationship Return/Risk

- Fundamental Hypothesis of the MPT: investors are Risk Averse.
- MPT states that expected return on an investment and investment risk are directly proportional.

Investor's Risk aversion levels

- **The problem is that all investors would like to achieve high returns, but not all of them are able to bear high risk. Risk can be represented by a loss in invested capital (downside risk) or by excessive capital fluctuation (standard deviation).**
- **In other words, not all investors have the same risk aversion level**

Risk Aversion or Volatility Aversion?

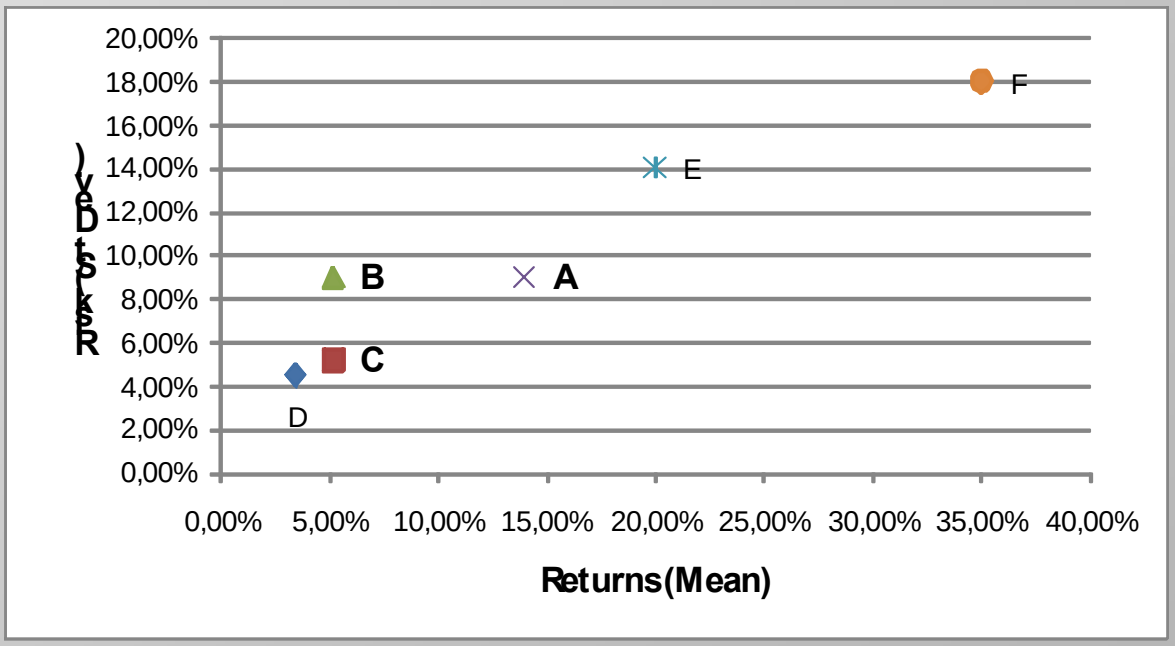
- **The term "*risk*" tends to have a negative meaning; in reality, since risk embeds uncertainty of results, a higher risk implies:**
  - **a higher probability of losses;**
  - **a higher probabillity of achieving higher returns.**

- **Risk is, therefore, a negative element and a positive element.**

The Risk-Return Relationship

Based on these assumptions it is possible to choose different asset classes:

- **Given the same Return, the activity with lower risk is preferable**
  - ***C is better than B***
- **Given the same Risk, the activity with higher return is preferable**
  - ***A is better than B***

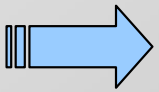


Choosing is not always easy!

Between A and C, which is better?

Portfolio Optimization

AIM



To determine the optimal composition of a portfolio

Assuming to know:

- The investor's *risk tolerance*
- Determining of the *asset classes* to be included in the portfolio

Markowitz's Model

Aim

- To define the optimal portfolio able to provide the investor with the highest expected return given a risk level, or, viceversa, the lowest possible risk given a value of expected return

Markowitz's Hypotheses

- Investors choose their portfolios according to 2 parameters: average expected return and expected risk; this last is measured as variance of returns (mean variance principle).
- Investors are risk adverse and they maximize expected utility
- Uniperiodicity

From 1 asset to a portfolio

- Portfolio return is given by the weighted mean of all the asset returns
- Portfolio risk is less than or equal to weighted risk of all assets
- Thus, investing in a Porfolio is better than in a single asset since a portfolio has a lower risk due to diversification

From 1 asset to a portfolio

- **The best Portfolio is not the one formed by the less risky assets taken individually.**

- **Correlations among the assets are important.**

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

From 1 asset to a portfolio: example

- 3 assets: A, B, C
- 3 years: 1st, 2nd, 3rd
- The assets have the following returns:

ASSET	YEAR 1	YEAR 2	YEAR 3
A	5	10	15
B	0	10	20
C	30	5	-5

- **Which is the best Asset?**

From 1 asset to a portfolio: example

- **Calculate the risk and average return of the three assets:**

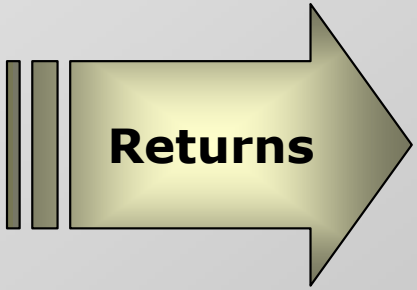
ASSET	Avrg RET	RISK
A	10.00	between 5.0 and 15.0
B	10.00	between 0.0 and 20.0
C	10.00	between 30.0 and -5.0

- **The risk is intuitively represented by the range of the possible returns in the 3 year period:**
  - **Asset A dominates asset B**
  - **Asset B dominates asset C**

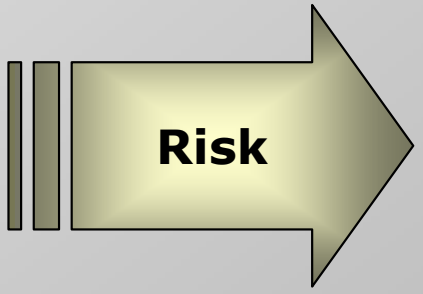
From 1 asset to a portfolio: example

Which is the best portfolio?

(Note: 2 assets of equal weight)



ASSET	Year 1	Year 2	Year 3	Avrg Return
AB	2.50	10.00	17.50	10.00
BC	15.00	7.50	7.50	10.00
AC	17.50	7.50	5.00	10.00



ASSET	Min Ret	Max Ret
AB	2.50	17.50
BC	7.50	15.00
AC	5.00	17.50

From 1 asset to a portfolio: example

- Considering risk and return of the 3 portfolios:

ASSET	Avrg Ret	Risk
AB	10.00	15.00
BC	10.00	7.50
AC	10.00	12.50

1) Portfolio BC dominates all the others,despite asset A, the best of the 3 assets was not picked.

2) Investors prefer to select portfolio BC in spite of the single asset A; even though A, individually, dominates the other assets.

Correlations among Assets

- **The previous example shows that the portfolio return equals the weighted average of the individual asset returns; whereas, portfolio risk decreases as correlations among the assets decrease.**

- **Correlation is a statistical measure of how much the movement of two securities or asset classes are related. The range of possible correlations is between -1 and +1**

Correlations among Assets

- **Positive Correlation equal to 1: Assets move in the same direction and with the same intensity;**
- **Positive correlation (> 0): Assets move, in general, in the same direction;**
- **Zero correlation (= 0): assets move independently one from the other;**
- **Negative correlation (< 0): assets move, in general, in opposite directions;**
- **Negative correlation equal to -1: assets move in opposite directions with the same intensity.**

Portfolio Diversification

Aim

- **To reduce portfolio risk. The risk is calculated as the variance of the returns, σ_p^2.**

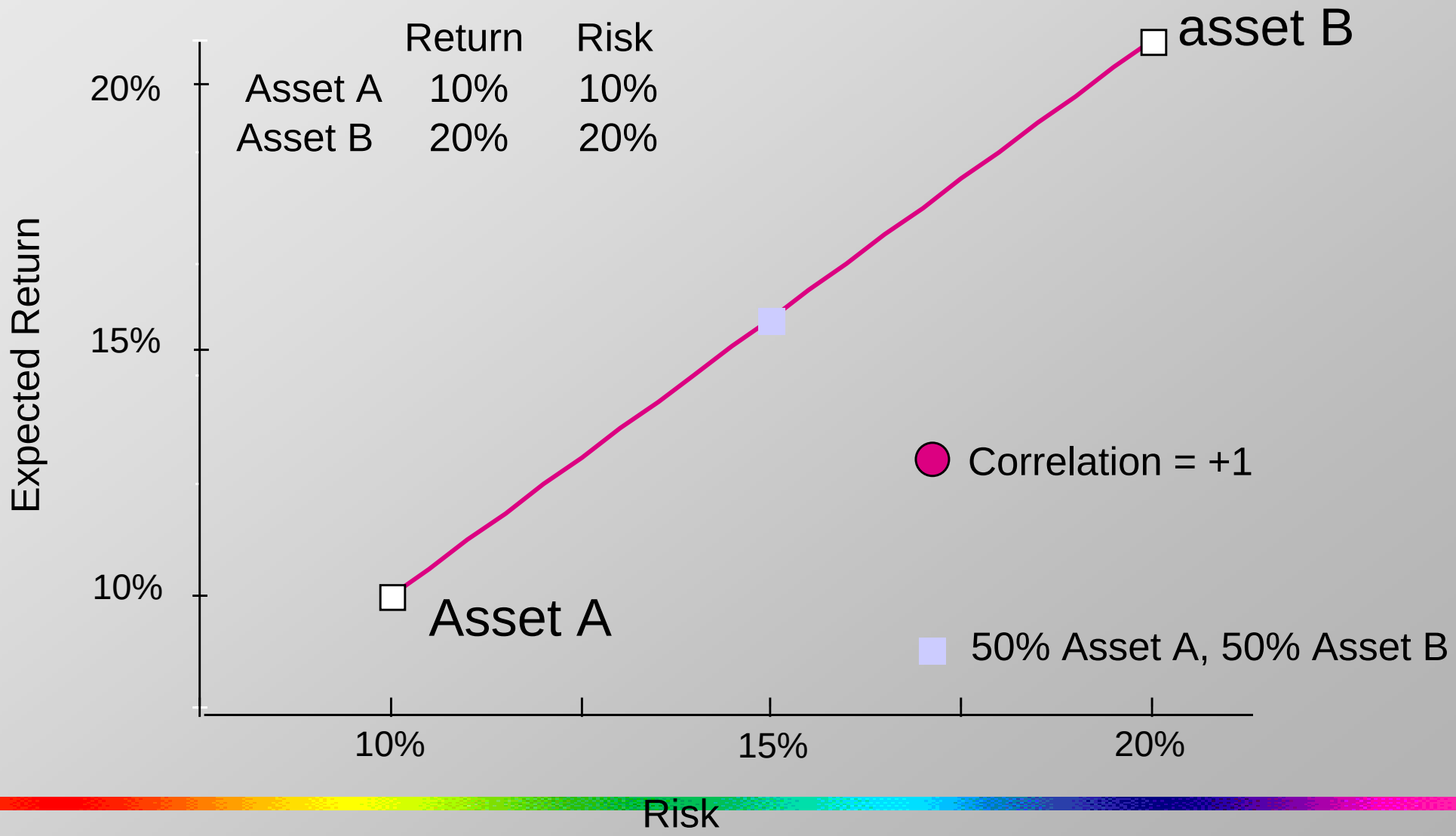
$$\sigma_p^2 = \sum_i X_i^2 \cdot \sigma^2(R_i) + \sum_i \sum_j X_i \cdot X_j \cdot \sigma(R_i) \cdot \sigma(R_j) \cdot \rho_{i,j}$$

where X_i and X_j: portfolio i-th and j-th asset weights

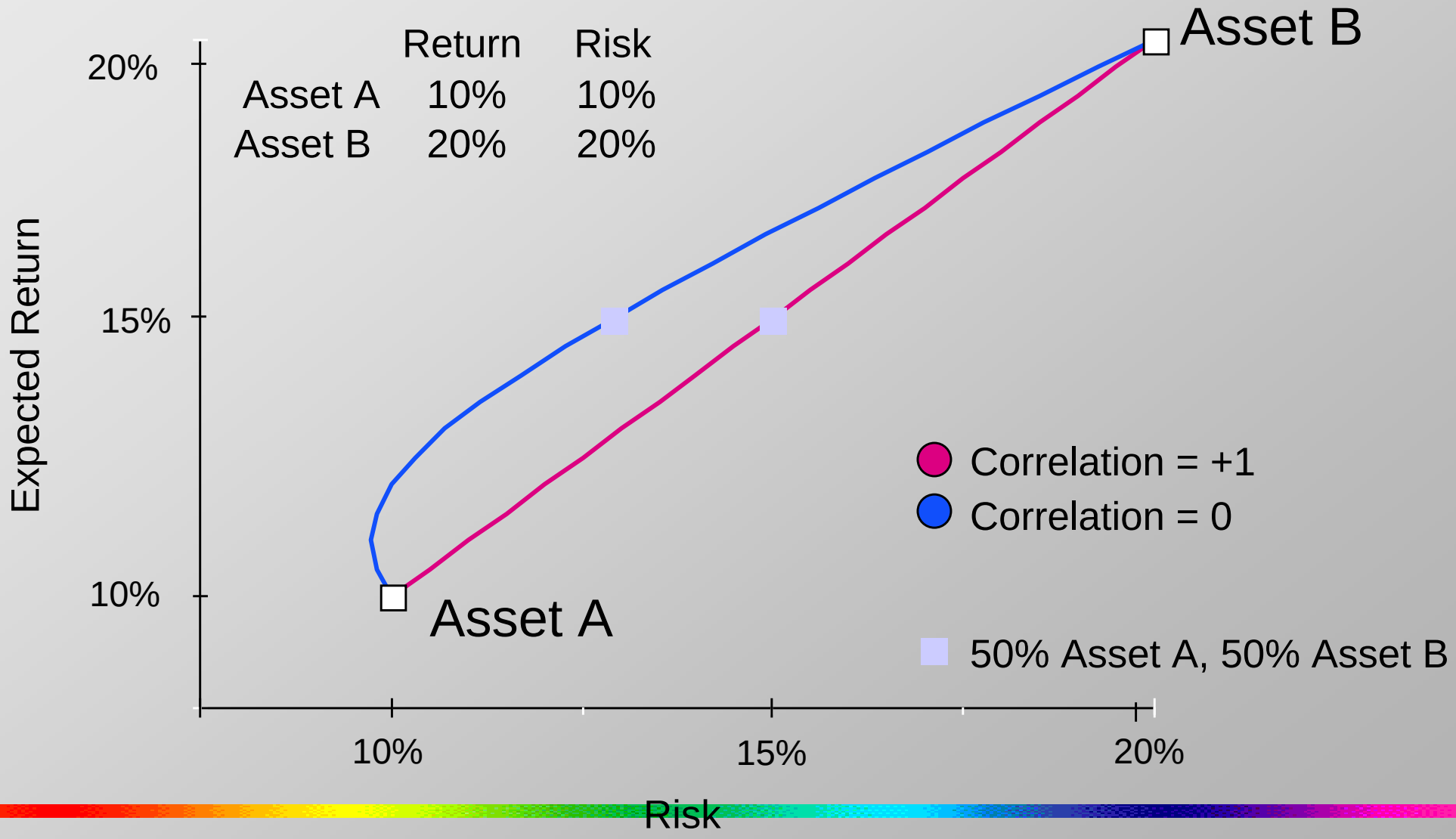
Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

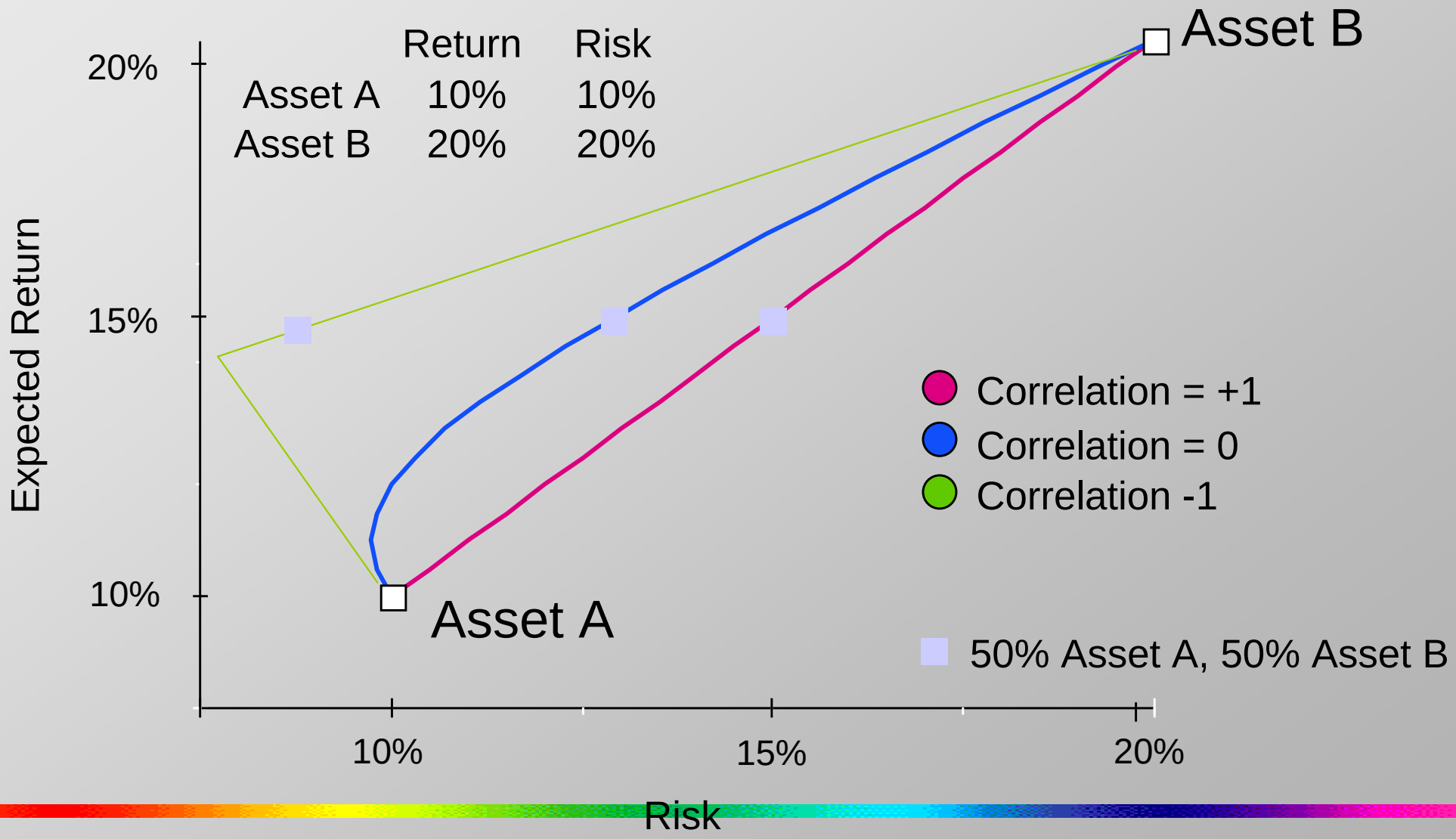
The benefits of diversification



The benefits of diversification



The benefits of diversification



Portfolio Diversification

How

- Picking and including in the portfolio those assets with a correlation different than 1

Effect

- Portfolio Risk is different than the simple average of the individual asset risks included in the portfolio

Portfolio Diversification

Scenario 1:

- Portfolio composed by N assets. Every Asset has risk equal to σ and is zero correlated (ρ=0).
- Portfolio Risk σ_p *is* that is $\sigma_p < \sigma$

$$\sigma_p = \frac{\sigma}{\sqrt{N}}$$

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Portfolio Diversification

Scenario 2

- Portfolio composed by N assets. Every Asset has risk equal to σ, weights 1/N, and correlations $\rho<1$

$$\sigma_p = \sigma\left(\sqrt{\frac{1+\rho(N-1)}{N}}\right)$$

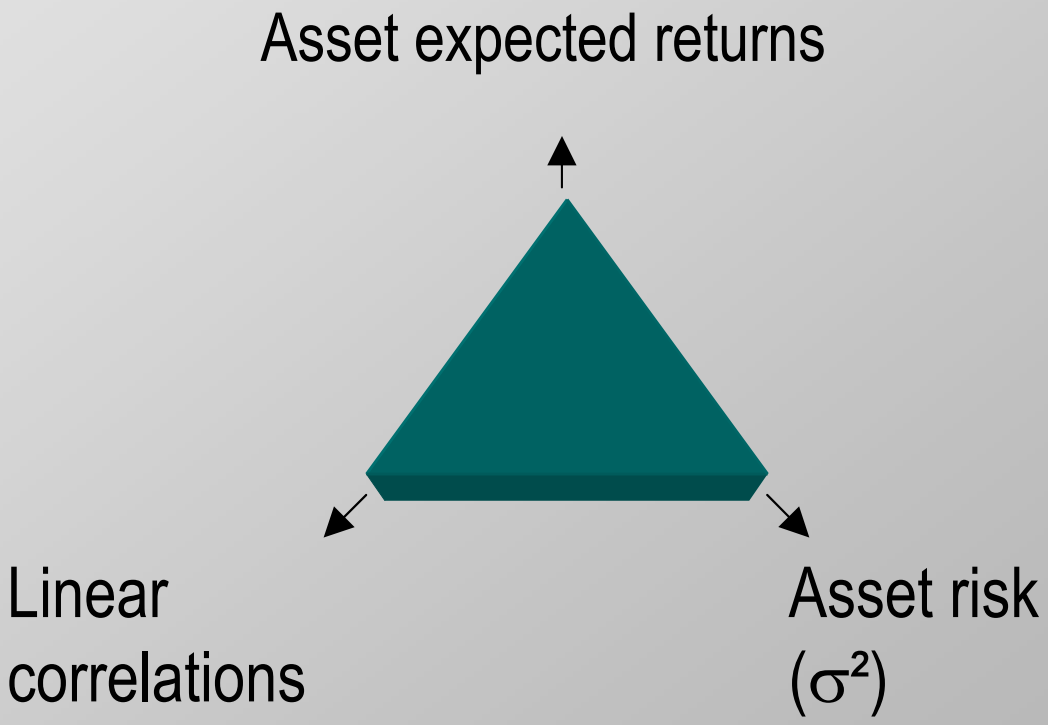
- That is $\sigma_p<\sigma$

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Markowitz's Model

inputs



2-Asset Model

Given…

X_i → weight of the i-th asset

Constraint → $\sum_i X_i = 1$ with i=1, 2,...n\

Given…

a portfolio P formed by 2 assets, A and B with expected returns $E(R_A)$ and $E(R_B)$ and with weights (X) and (1- X), respectively,

2-Asset Model

- The portfolio expected return μ_p is:

$$\mu_p = E(R_p) = X \cdot E(R_A) + (1-X) \cdot E(R_B)$$

where X + (1-X)=1

- The portfolio risk σ^2_p is:

$$\sigma^2_p = X^2 \cdot \sigma^2_A + (1-X)^2 \cdot \sigma^2_B + 2 \cdot X \cdot (1-X) \cdot \sigma_A \cdot \sigma_B \cdot \rho_{AB}$$

where

σ^2_A: Asset A variace

σ^2_B asset B variance

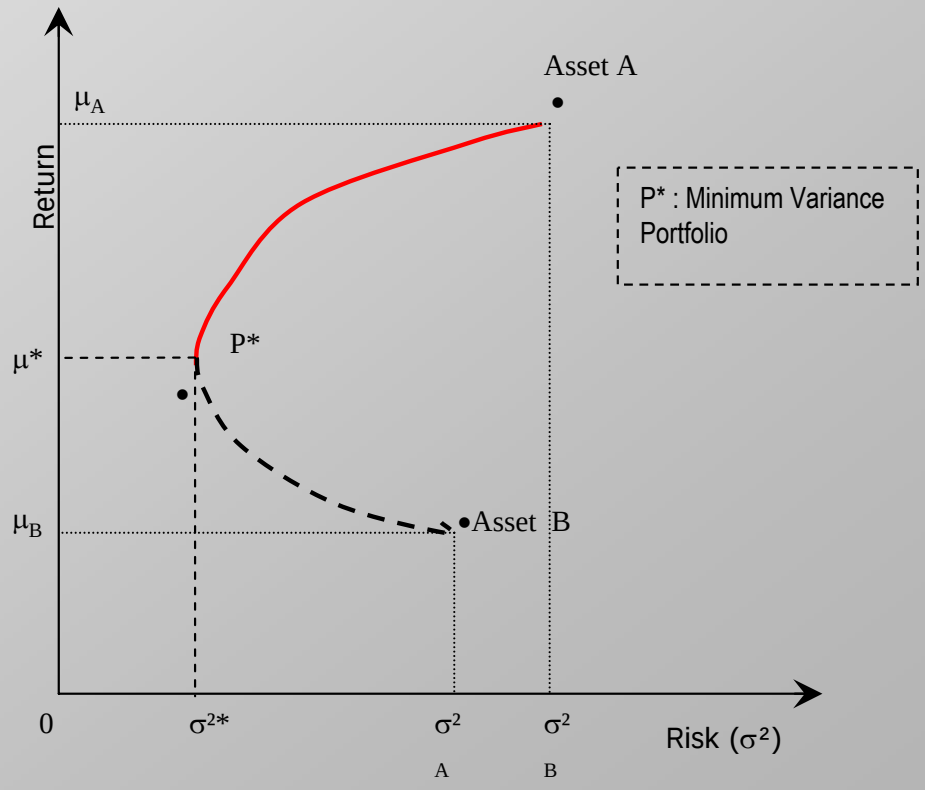
σ_A: asset A standard deviation

σ_B: Asset B standard deviation

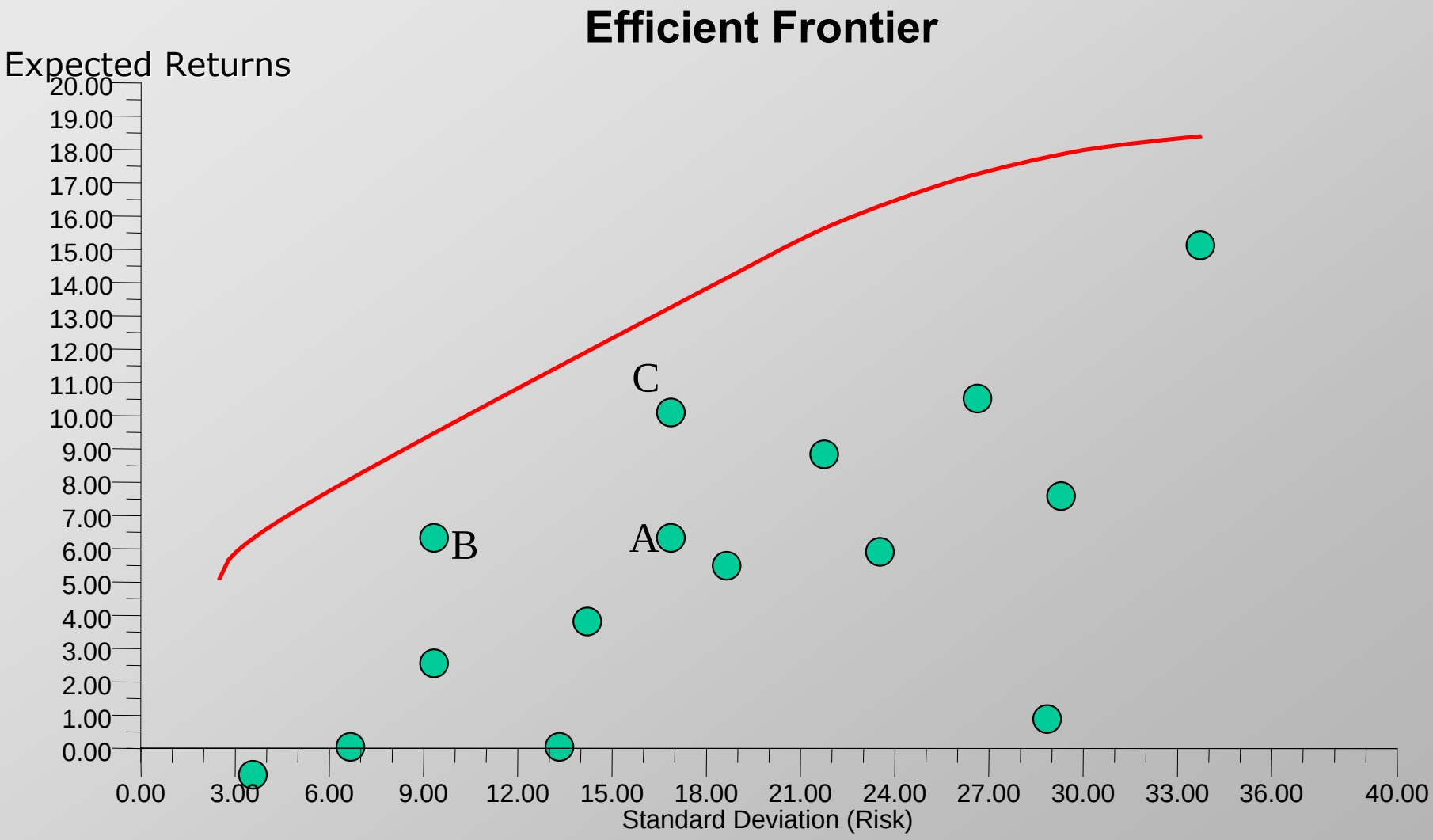
ρ_{AB}: correlation between A and B.

2-Asset Model

- BY varying the weight of A, (**X**), we get a series of points P(μ,σ^2) on the plane [μ , σ^2] (mean-variance), which define the region of market opportunities.
- The upper edge of such region is called the **Efficient Frontier**



Portfolio Optimization



Efficient Portfolio given N assets

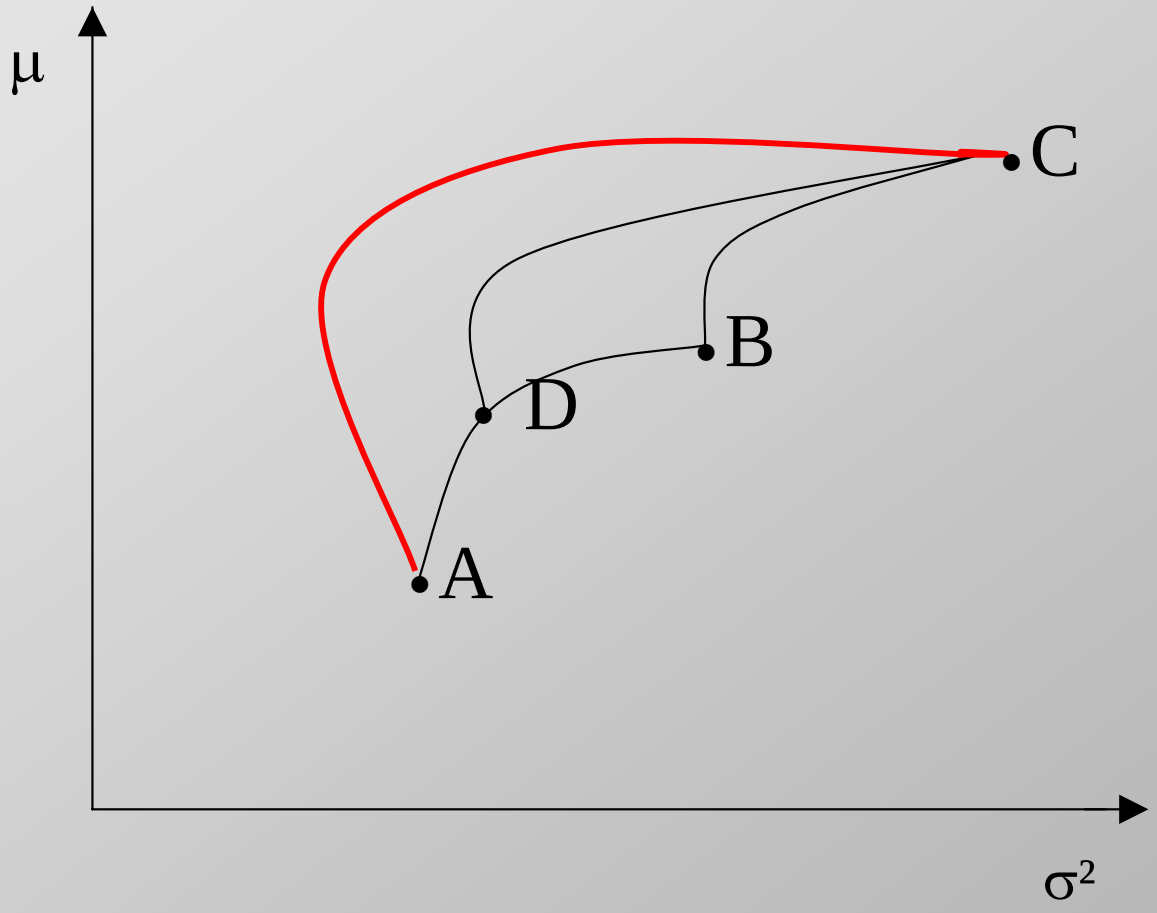
Given : 3 assets A, B, C

AB: Efficient Frontier Assets A and B.

BC: Efficient Frontier Assets B and C.

If we consider portfolio D on the line AB, it is possible to construct an efficient frontier DC between asset C and D. The curves constructed by all the combinations among assets and portfolios form the efficient frontier AC for the 3 assets.

Efficient Portfolio given N assets



Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Efficient Portfolio given N assets

By iteratively repeating the process N times, we obtain the efficient frontier for N assets; the efficient frontier points have coordinates (μ,σ^2) given by:

$$E(R_p) = \sum_i E(R_i) \cdot X_i$$

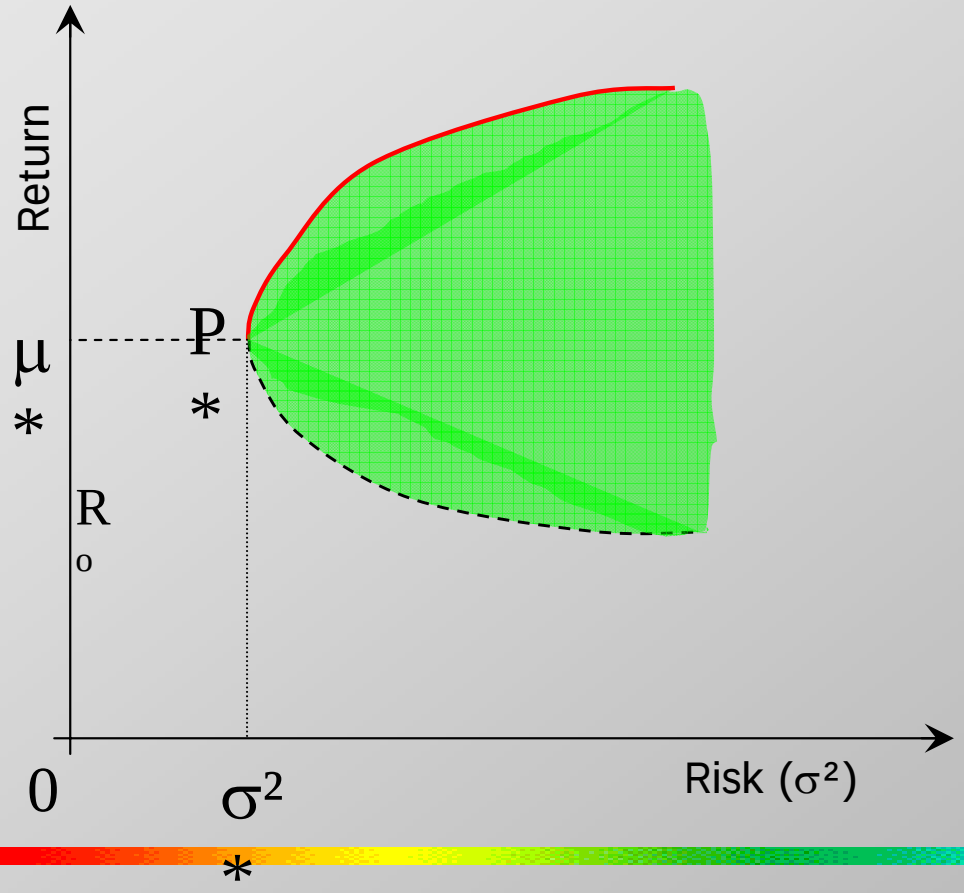
$$\sigma^2_p = \sum_i X_i^2 \cdot \sigma^2(R_i) + \sum_i \sum_j X_i \cdot X_j \cdot \sigma(R_i) \cdot \sigma(R_j) \cdot \rho_{i,j}$$

with i,j=1, 2, …..n

Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Efficient Portfolio given N assets

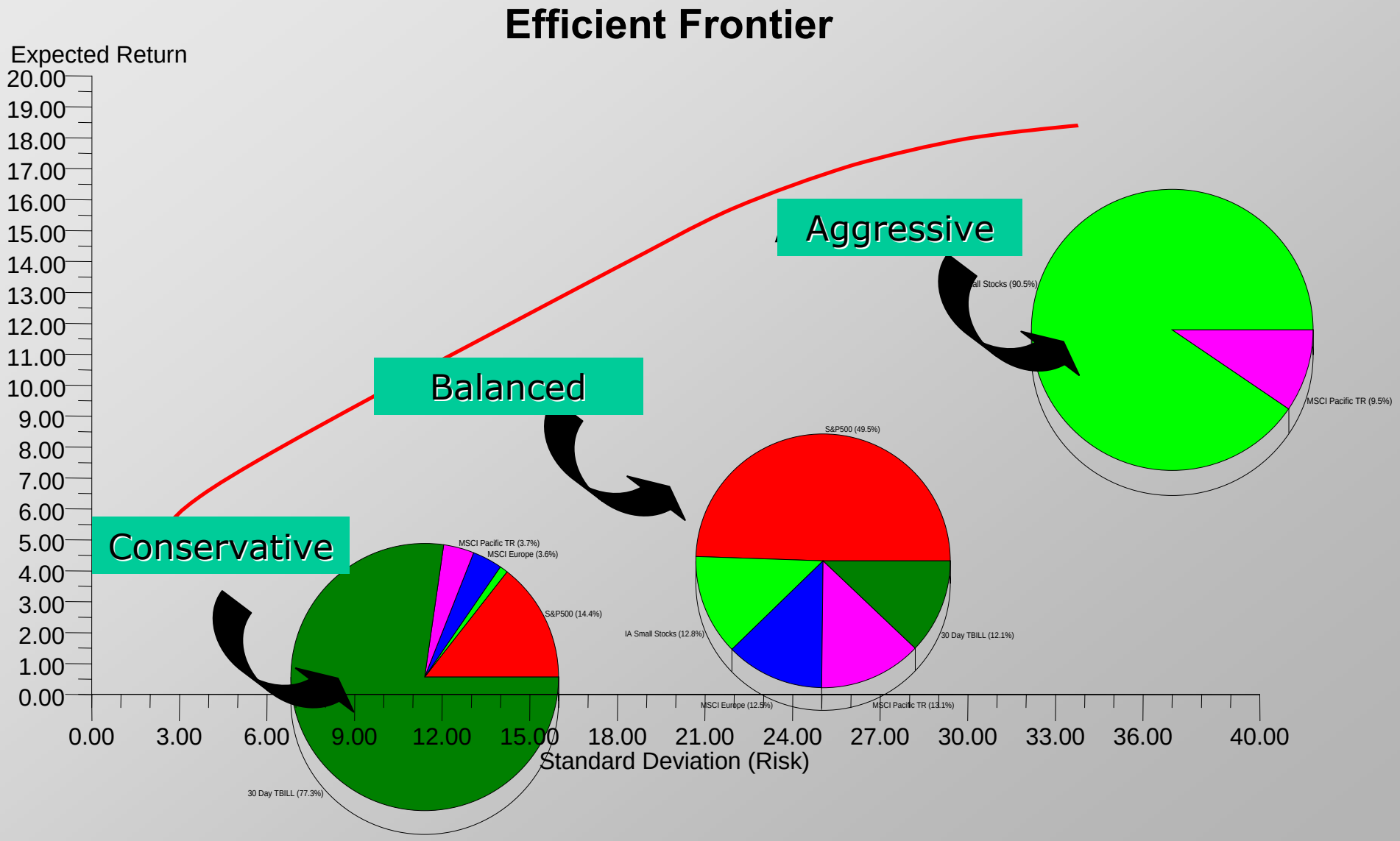


In case of more assets, the procedure is more complicated because all the correlations are to calculated.

The Efficient Frontier

- **Includes the optimal portfolios given the trade-off risk/return.**
- **It is not possible to calculate, ex-ante, any portfolio which goes above the efficient frontier.**
- **All the portfolios which are located below the efficient frontier are not efficient; in fact, there exists a better portfolio with the same risk and a better portfolio at the same return level.**

The Efficient Frontier



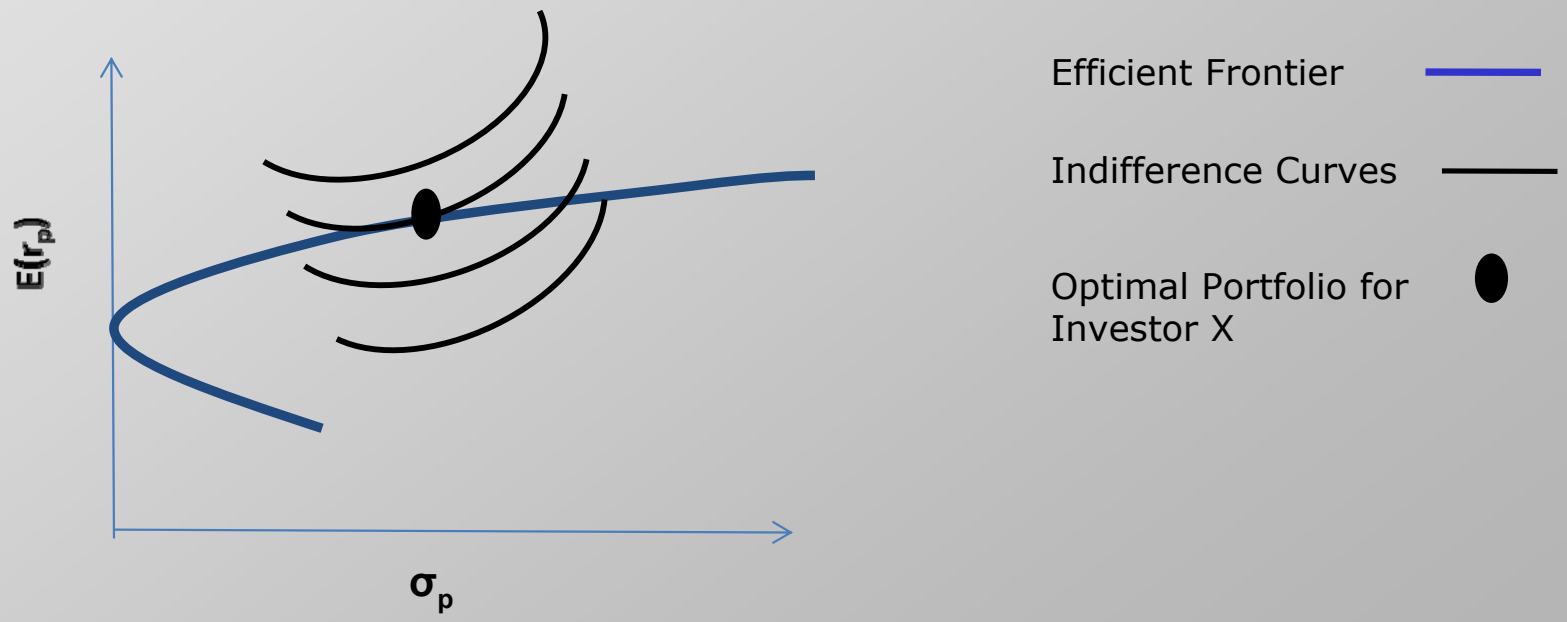
- After defining the Efficient Frontier, the optimal portfolio for a specific investor needs to be chosen.

- Markowitz's model uses Indifference Curves based on the Utility Function Squared.

- $E(u) = E(r) - 1/2\lambda\sigma^2$

Where:
σ standard deviation
E expected value operator
λ Risk Aversion Coefficient
u utility function
r return

- Given a set of Indifference Curves, the Optimal Portfolio is determined by the Risk and Return values defined by the tangential point of the Efficient Frontier with the highest Utility Curve of the set.

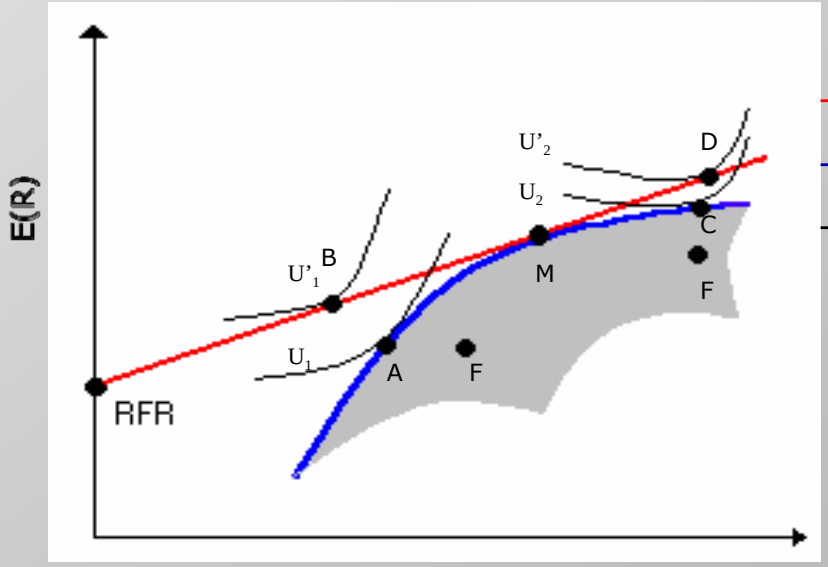


Some Negative Aspects and Weaknesses of Markowitz's Model

- Simplifying assumptions: i.e. all asset are risky
- Parameter estimation
- Incompleteness of the picking criteria
- Uniperiodicity
- Extreme optimal portfolio weights enhanced by using asset allocation constraints
- Symmetric definition of risk

The Capital Asset Pricing Model - CAPM

- MPT by Markowitz has proven the existence of the Efficient Frontier, CAPM introduce risk free asset and risk free loan
- Which portfolio is preferable?
- It depends on the investor's risk averse level



- CAPITAL MARKET LINE
- EFFICIENT FRONTIER
- RETURN/RISK INDIFFERENCE CURVES

The Capital Asset Pricing Model - CAPM

- If an investor can go short, and can get a loan at the *Risk Free Rate (RFR), among the portfolios on the efficient frontier, it is possible to identify* a portfolio (M) which is the preferred one.
- Portfolio M, named market portfolio, is the only one in which investors are interested in. The line connecting the RFR and M is the *Capital Market Line (CML)*.

The Capital Asset Pricing Model - CAPM

Market equilibrium requires:

1) that the *Risk Free Rate* is such that offering risk free rate is equal to asking risk free rate;

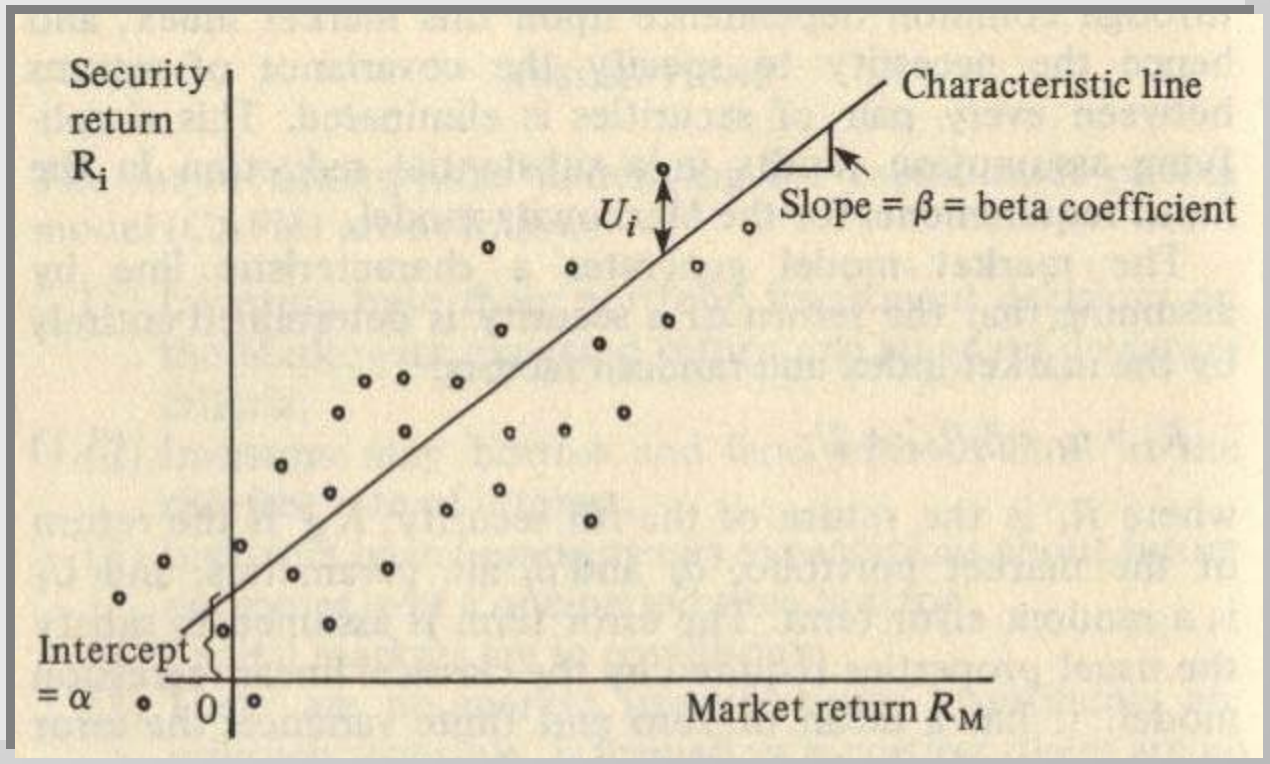
2) All investors hold only portolio M.

Market Model

$$r_i = \alpha_i + \beta_i r_{mkt} + \varepsilon_i$$

Where:

r_i asset return
α asset return when market return is zero
β systematic risk
r_{mkt} market return
ε random error term



Courtesy Dobbins R. Witt S.F., "Portfolio Theory and Investment Management"

- ß >1 agressive securities; larger price variation than market trend.
- 0< ß<1, defensive securities; smaller price variation than market trend.
- ß<0 anticyclical securities; price variation opposite to market trend (theoretical Hypothesis)

Portfolio Diversification

$$\text{Risk } (\sigma) = R_{systematic} + R_{specific}$$

- **Systematic Risk (market risk)** $\Rightarrow$ Risk Component given by the asset sensibility to market oscilations (β)

$$\beta = \rho_{i,m} \frac{\sigma_i}{\sigma_m}$$

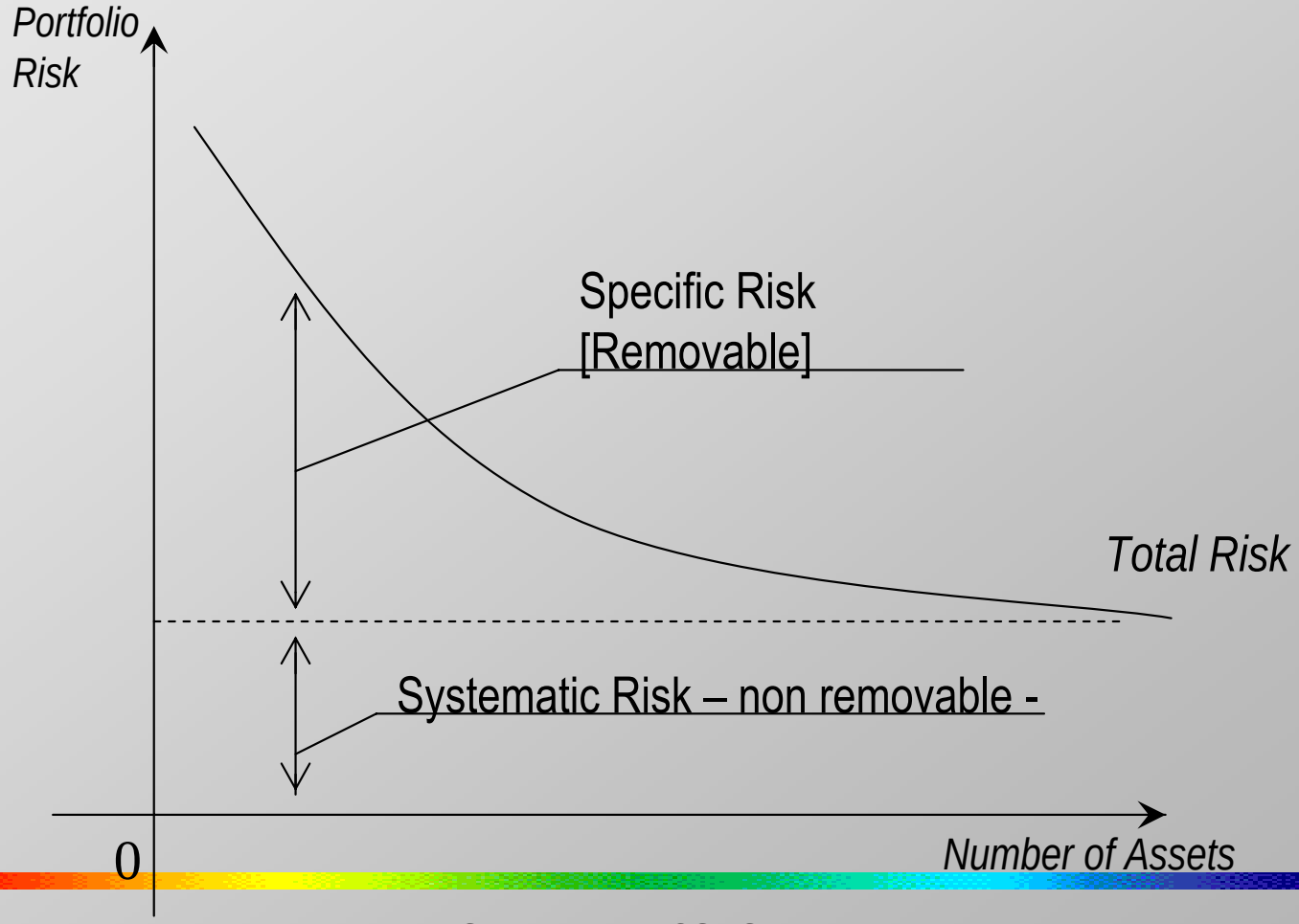
Where:
ρ correlation
σ standard deviation

- **Specific Risk (non-market risk)**
  $\Rightarrow$ Risk component derived from specific factors (business investment plans, dividends, etc.)

Diversification reduces non-systematic risk only

Portfolio Diversification

Number of Assets: chart analysis ...



Black and Litterman – B&L: parameters estimation

- One of the main limits of Markowitz's model concerns expected returns estimation.
- Black and Litterman [1992] model estimates asset class returns, calculated as the weighted average of equilibrium returns [excess return generated by an equilibrium risk premium – strategic returns] and investor views (tactical returns).

- Market Equilibrium:

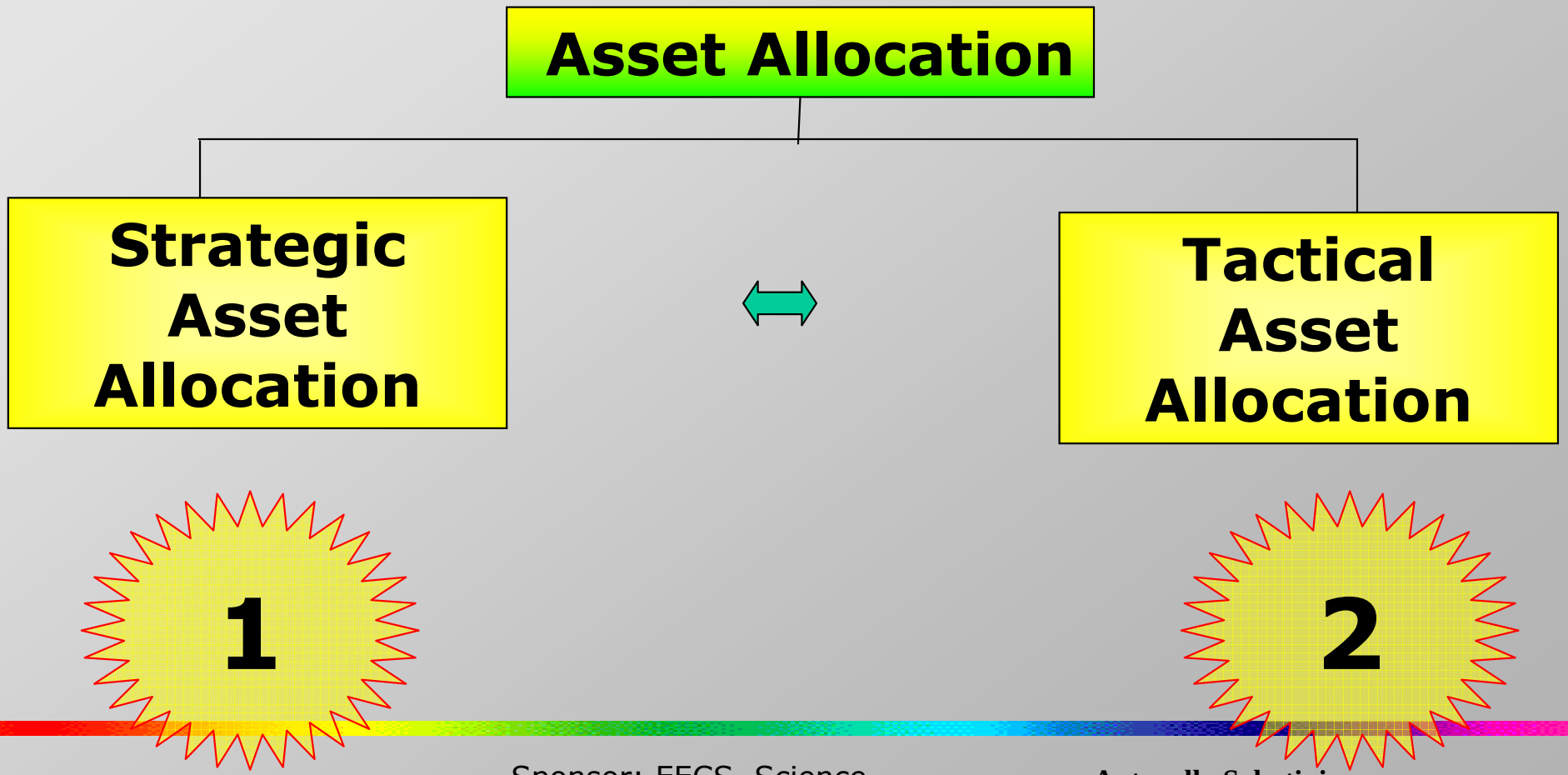
$$\lambda = \frac{Rmkt - Rf}{\sigma_{mkt}^{2}}$$

- Investor views: B&L Methodology allows to indicate two types of views:
  - Absolute views (fixed levels of returns for a single asset class)
  - Relative views (levels of outperformance/underperformance of an asset class compared to another)
  - For each view, a confidence level must be specified showing the asset-manager's confidence about his view.

- B&L returns, obtained by the combination of strategic returns and views, are integrated in a mean-variance optimization process (i.e. Markovitz's process).

- Constraints can also be considered (i.e. constraints about minimum and maximum exposition for each asset class or for each macro-asset class)

Asset Allocation



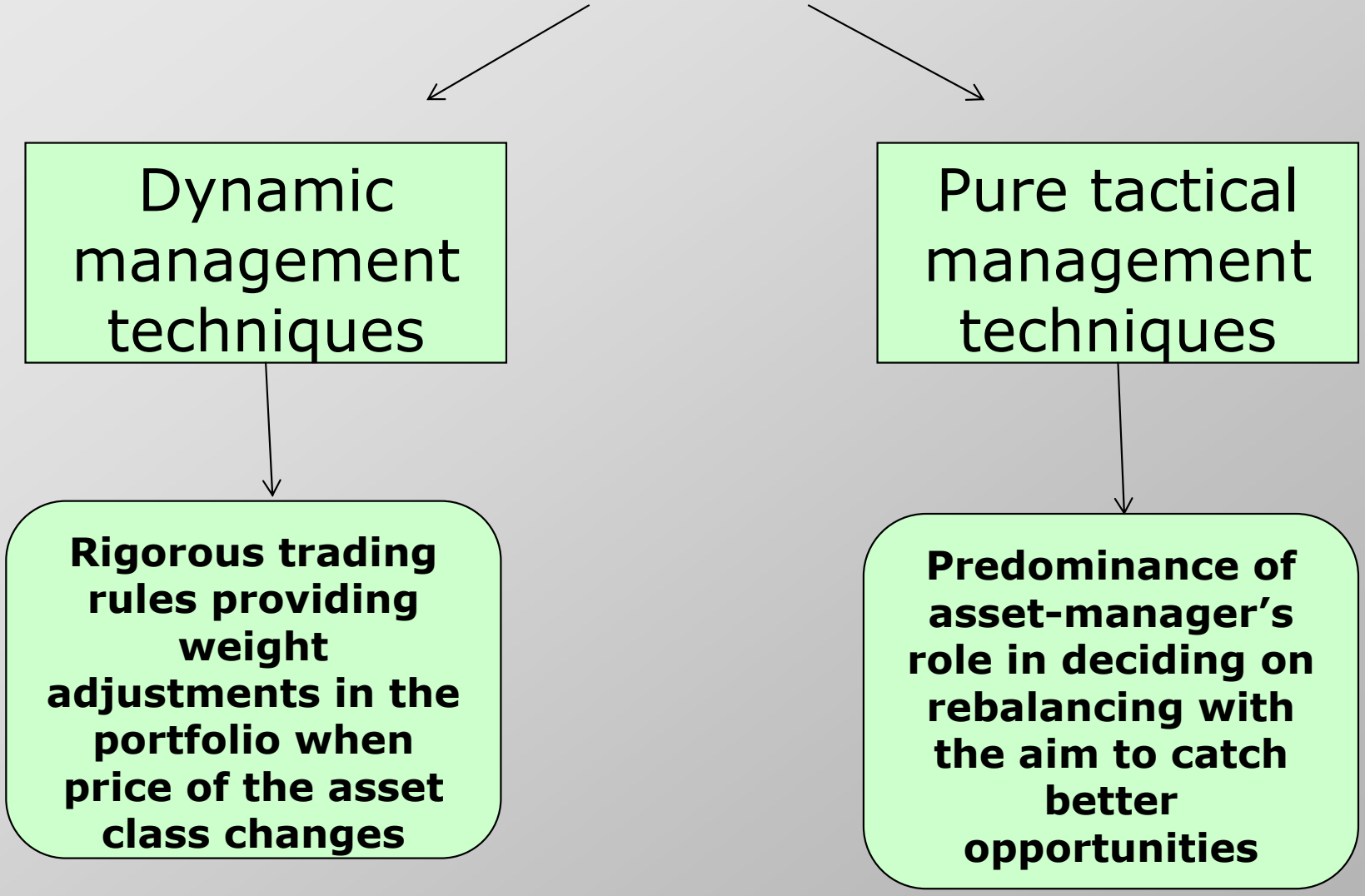
Sponsor: EECS, Science Engineering and Business Club, Graduate Student Council

Antonella Sabatini
Gino Gandolfi
Monica Rossolini

Tactical asset allocation

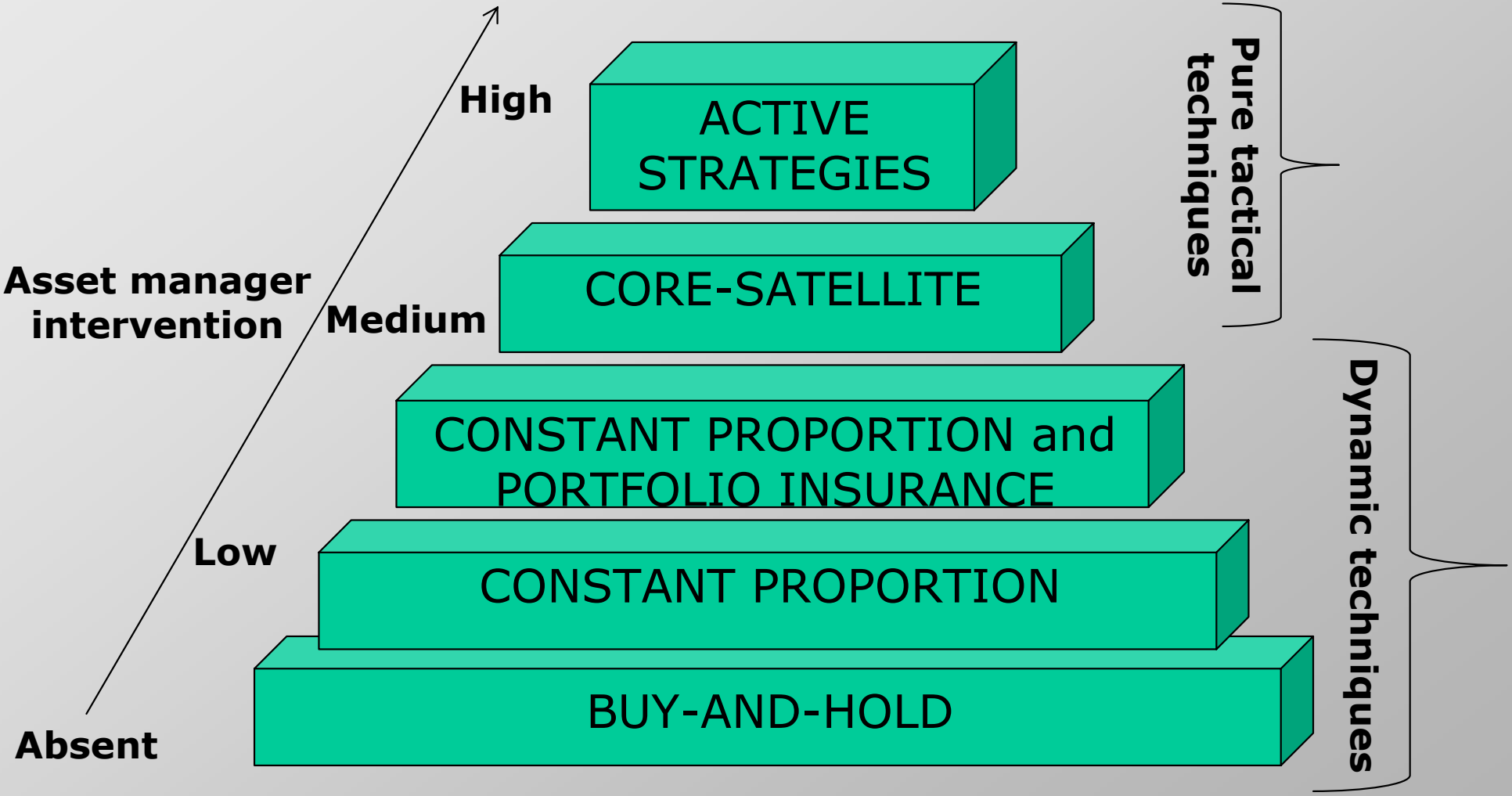
- Strategic asset allocation aims to define expected return and risk, and then the optimal portfolio in the medium and long period according to investor's features.
- **Tactical asset allocation**: is composed by all actions to manage portfolio in short period, within strategic lines define by strategic asset allocation

Tactical asset allocation



Tactical asset allocation strategies

Courtesy Sampagnaro G., "Asset Management: Tecniche e Stile di Gestione del Portafoglio"



BUY-AND-HOLD

- The necessity to periodically rebalance a portfolio is due to asset classes price fluctuations.
- ➔ change in asset weights ➔generating a change in risk/return ratio (defined by strategic asset allocation for strategic/optimal portfolio)

Example:

- Portfolio composed by:
  - risky asset (50%)
  - Non-risky asset (50%)
    - portfolio value 100
- 1 month later:
  - risky asset increase its value by 10%
  - What does it happen?
  - Portfolio value increases from 100 to 105
- Change in asset weights:
  - risky asset:55/105=52,38%
  - Non-risky asset: 50/105 =47,62%
- Is it a good composition for an investor's risk tolerance?

- In this scenario:
  - Buy-and-Hold strategies do nothing
  - the weights change depending on the asset price

Advantage:

- Low cost

Disadvantage:

- High correlation between a risky asset and the market

CONSTANT PROPORTION

Constant Mix Strategy: the aim is to conserve the initial weight composition that tends to variate with price fluctuations.

Example:

- Portfolio composed by:
  - risky asset (50%)
  - Non-risky asset (50%)
  - value 100
- After 1 month:
  - risky asset increases its value by 10% (from 50 to 55)
  - What does it happen?
- Portfolio value increases from 100 to 105
- Change in asset weights
  - risky asset: 55/105=52,38%
  - Non-risky asset: 50/105 =47,62%

- In this scenario:
  - the aim of constant mix strategy is to conserve the initial composition
    - 50% risky asset
    - 50% non-risky asset

- Selling a part of risky asset for a value of 2,38 % of portfolio value and with this money buying non-risky asset.

When does the asset-manager rebalance a portfolio?

- Periodic rebalancing (fixed time intervals)
- Threshold rebalancing (rebalancing takes place when asset class weights change more than a specific level (Threshold) as a consequence of asset price fluctuations.
- Range rebalancing (similar to the previous one; rebalancing does not aim to restore the strategic asset allocation weights; but it provides maximum deviation)
- Volatility based rebalancing (rebalancing takes place when the volatility increases above a specific level)

CONSTANT PROPORTION AND PORTFOLIO INSURANCE

- CPPI, asset allocation strategy defined by dynamic rebalancing, offers
  - the possibility to capture market opportunities
  - to protect the portfolio value, with a combination of risky assets and non-risky assets

CORE-SATELLITE

- The portfolio is divided into 2 parts:
  - the core-portfolio
  - the satellite-portfolio
- Core portfolio: passive strategy aiming to obtain benchmarked performance (i.e. ETF)
- Satellite-portfolio: active strategy aiming to obtain an overperformance compared to
  - the benchmark
  - the core portfolio

Advantages:

To obtain differential returns with lower costs

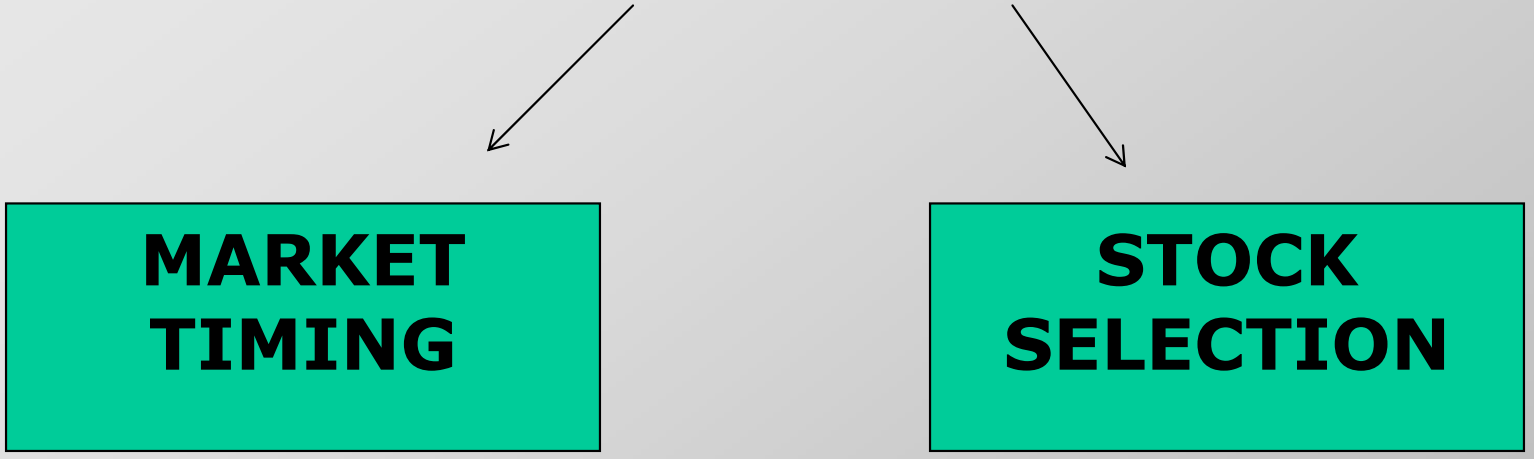
Fund	Active risk constraint	Load
A	5%	40 b.p.
B	0%	20 b.p.
C	20%	55 b.p.

Example:
100% fund A, Active risk 5%, Load 40b.p.
Otherwise
75% (core) fund B, Active risk 0%, Load 15 b.p.
25% (satellite) fund C, Active risk 5%, Load 13,75 b.p.
Portfolio (core+satellite): Active risk 5%, Load 28,75 b.p.

ACTIVE STRATEGIES

- Active strategies aim to obtain an extra performance compared to the benchmark
- Passive strategies aim to obtain the same performance of the benchmark.

Active strategies



2. Market Timing

'Forecasting of market dynamics – Portfolio Rebalancing in consequence of Trend Forecasts in order to improve portfolio performance

2. Market Timing

Market timing requires:

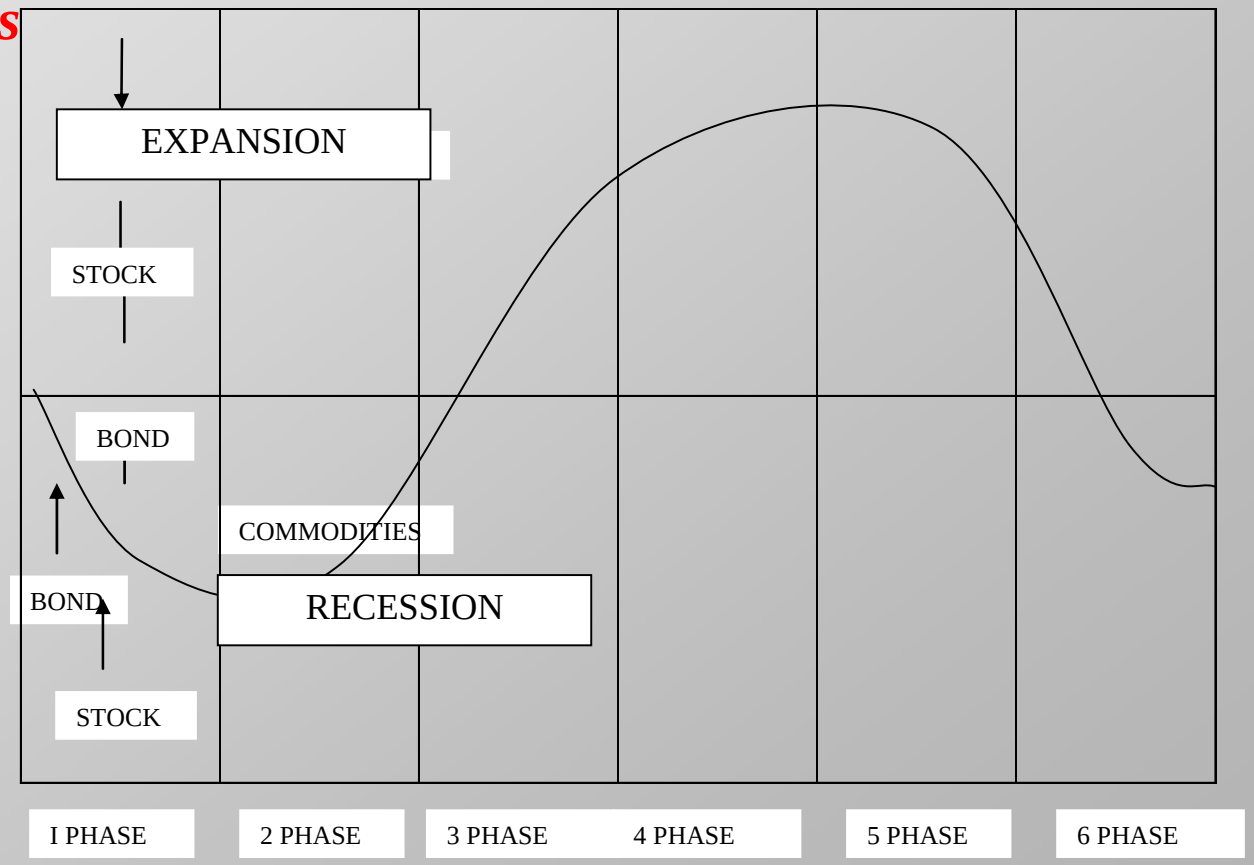
- Forecasting skills (scenario analysis, Macro trends etc.);
- Timing Skills;
- Managing the interacting factors and market variables (Inflation/Interest Rates; Interest Rate /Returns; Beta/Returns, etc.)
- Technical Analysis indicators and charting skills

2. Market Timing

Typical Activity of Tactical Strategies of short term investing/disinvesting activities

Timing and economic Cycles

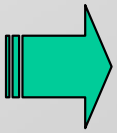
Portfolio manager tends to take investment opportunities deriving from adapting SAA techniques to the current economic cycles via rebalancing among the different asset classes



2. Market Timing

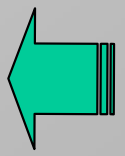
During an activity where **market timing** predominates, the Manager tends to focus on a small number of securities for which he/she has quantitative and qualitative data in support of his/her analysis

The objective in this case is:



Outperforming relative to the *benchmark* by increasing the portfolio sensitivity to the expected returns

The Risk is:



Excessive reduction of portfolio diversification and asymmetry between risk tolerance and market volatility exposure.

2. Market Timing

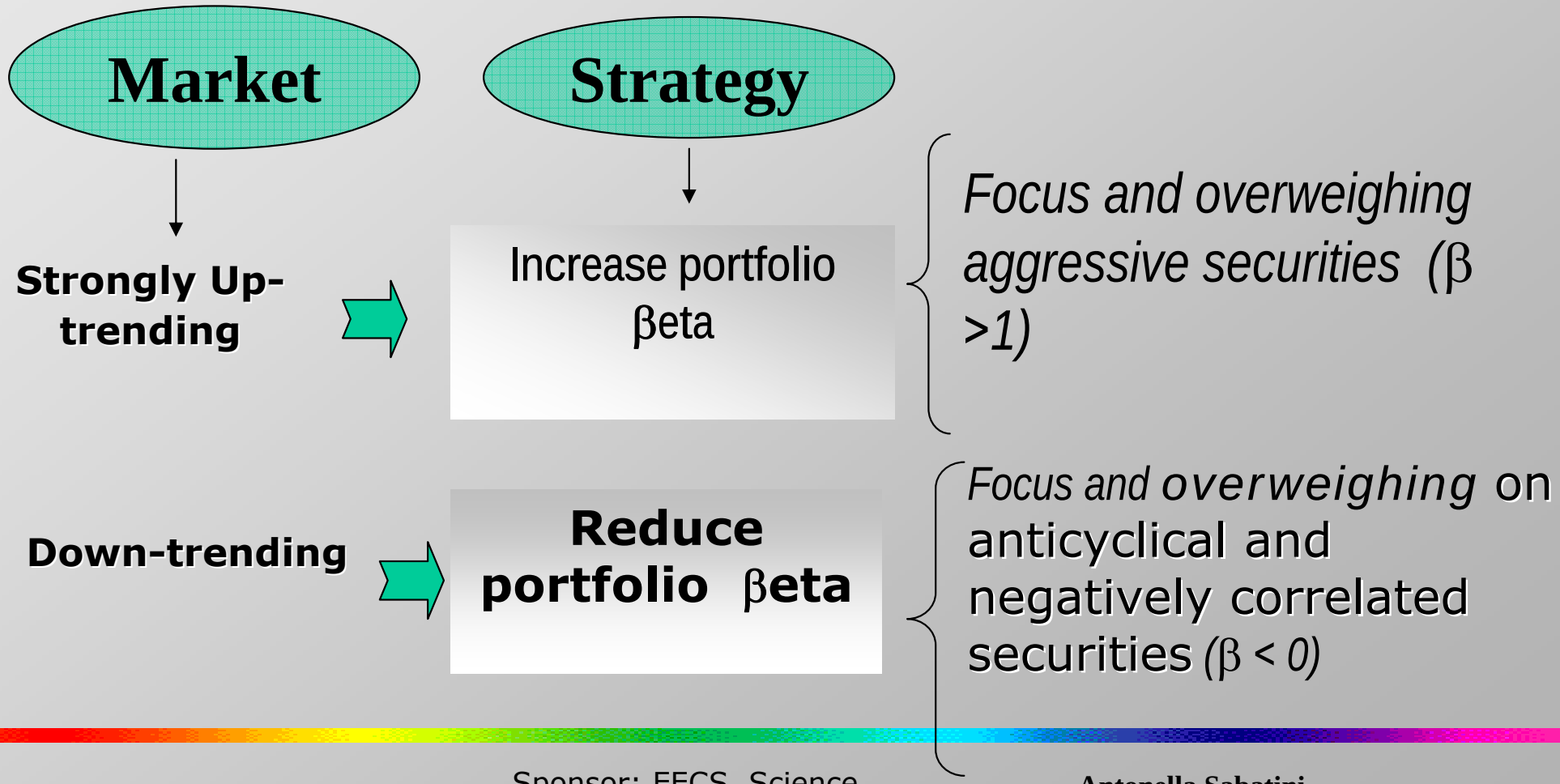
Market timing and *β-based* strategies for the stock portion of the portfolio:

BETA VALUES	MARKET PHASE	Securities CLASSIFICATION
$\beta \leq -1$	Market Recession	Atypical securities
$\beta \leq -0.5$	Down-trending market	Anticyclical securities
$-0.5 \leq \beta \leq 0.5$	Non-trending market	Conservative Securites
$0.5 \leq \beta \leq 1$	Up-trending market	Aggressive Securites
$\beta > 1$	Expanding market	High Risk securities

..continued

2. Market Timing

Market timing and *β-based* strategies for the stock portion of the portfolio:



2. Market Timing

Market Timing and fixed income Duration-analysis

Based on the *Modified Duration Formula*

$$\frac{dP}{P} = -D\frac{di}{1+i} = -DM\,di$$

[A measure of the price sensitivity of a bond to interest rate movements]
it is possible to follow a continuous duration analysis of the portfolio

SCENARIO	DURATION
RISING INTEREST RATES	LOW
FALLING INTEREST RATES	HIGH

2. Market Timing

Market Timing and fixed income
Duration-analysis

Negative Aspects of Duration Analysis

- numerous and complex data flow analysis (price, rate of return, cash flow of all the bonds);
- High frequency of calculations required (based on market fluctuations);
- Risk covered is Interest Rate risk only. Duration takes into account interest rate risk only and not global risk phenomena (credit risk, exchange rate risk, etc.)

3. Stock Picking

Analysis Activity and Securities Picking for insertion in a portfolio

Possible criteria for stock picking

Analysis of technical characteristics:

-Liquidity

-Risk

-Return

-Expiration date

3. Stock Picking

Securities	Liquidity	Risk	Return	Expiration
Certificates of Dep.	High	Low	Low	fixed
Treasury Notes	High	Low/Medium	Medium	Various
Bonds	Good	medium	Medium/ Low	Medium/Long
LT Bonds	Medium	High	High	Various
Stocks	Good	Highest	Highest	no expiration

Q&A

Thank you for your attention

Enjoy your pizza and drinks!!!

See you tomorrow!!!