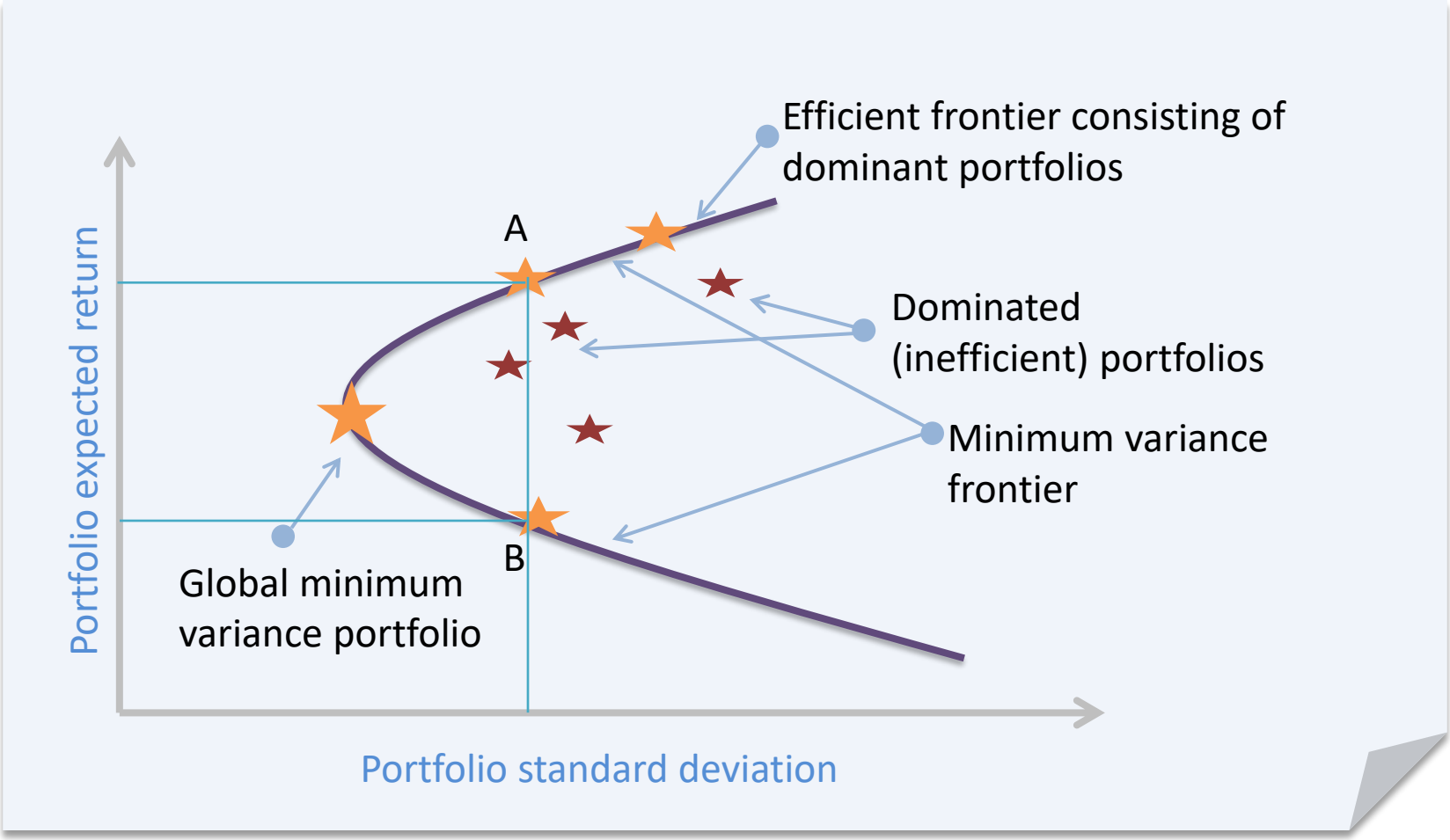
CONCEPT CAPSULES

EVOLUTION OF PORTFOLIO THEORY: FROM EFFICIENT FRONTIER TO SML

Minimum Variance Frontier & Efficient Frontier

- Assume you have the risk/return characteristics of 20 assets. With the help of a computer, you can calculate all possible portfolio combinations.
- The collection of all the minimum variance portfolios would form the **minimum variance frontier.**
- Along the minimum-variance frontier, the left-most point is a portfolio with minimum variance when compared to all possible portfolios - the **global minimum-variance portfolio**
- The **Efficient Frontier** represents all the **dominant** portfolios in the risk/return space.
  - A portfolio **dominates** all others if no other equally risky portfolio has a higher expected return, or if no portfolio with the same expected return has less risk.

Efficient Frontier



Example

Example 1

Which statement best describes the global minimum-variance portfolio?

A. The global minimum variance portfolio gives investors the highest levels of returns

B. The global minimum variance portfolio gives investors the lowest risk portfolio made up of risky assets

C. The global minimum variance portfolio lies to the right of the efficient frontier

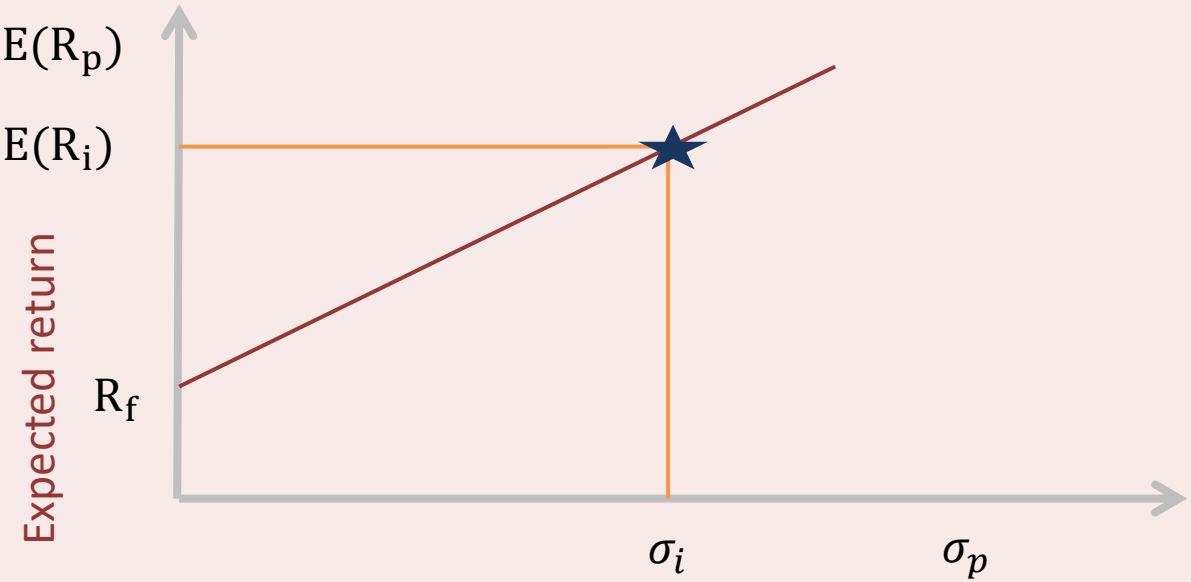
Solution

The correct answer is B.

The global minimum variance portfolio lies to the far left of the efficient frontier and is made up of a portfolio of risky assets that produces the minimum risk for an investor.

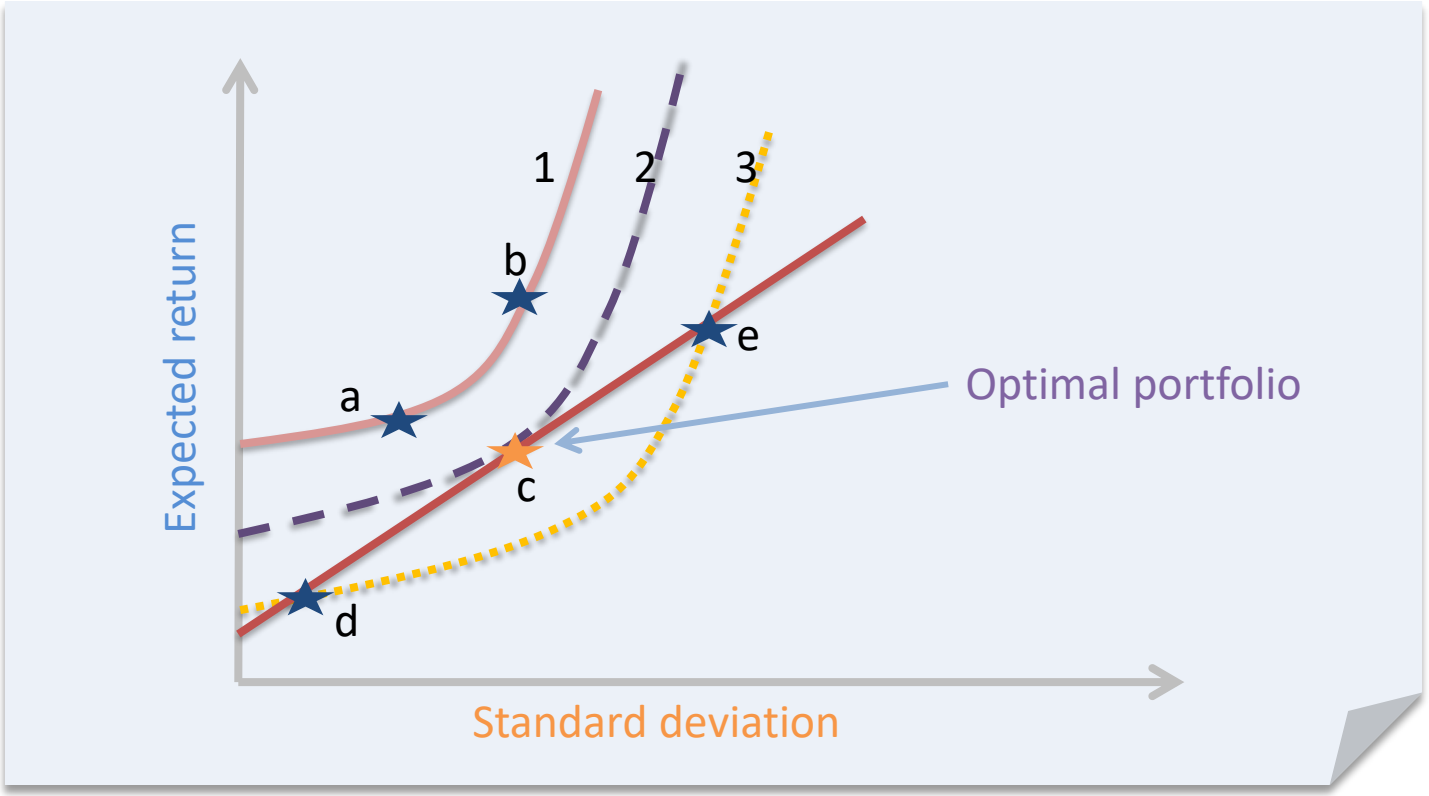
Capital Allocation Line (CAL)

The combination of a risk-free asset and a risky asset (the risky asset represents multiple portfolios available to the investor).



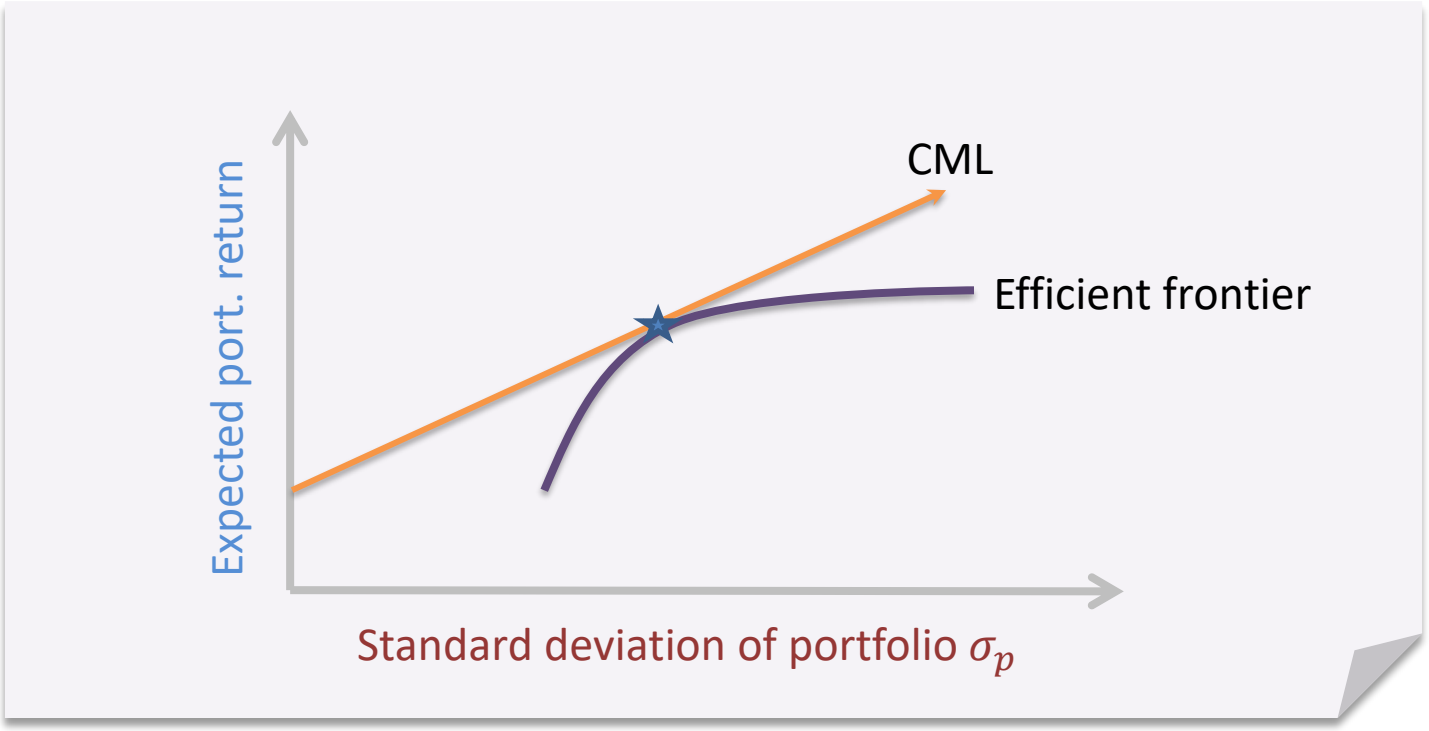
Capital Allocation Line (CAL)

To get the **optimal portfolio**, combine the indifference curves with the CAL:



Capital Market Line vs. Capital Allocation Line

The point where the risk-free asset touches, or is tangential, to the Markowitz portfolio, gives the market portfolio. The line connecting the risk-free asset with the market portfolio is the CML.



Types of Risk

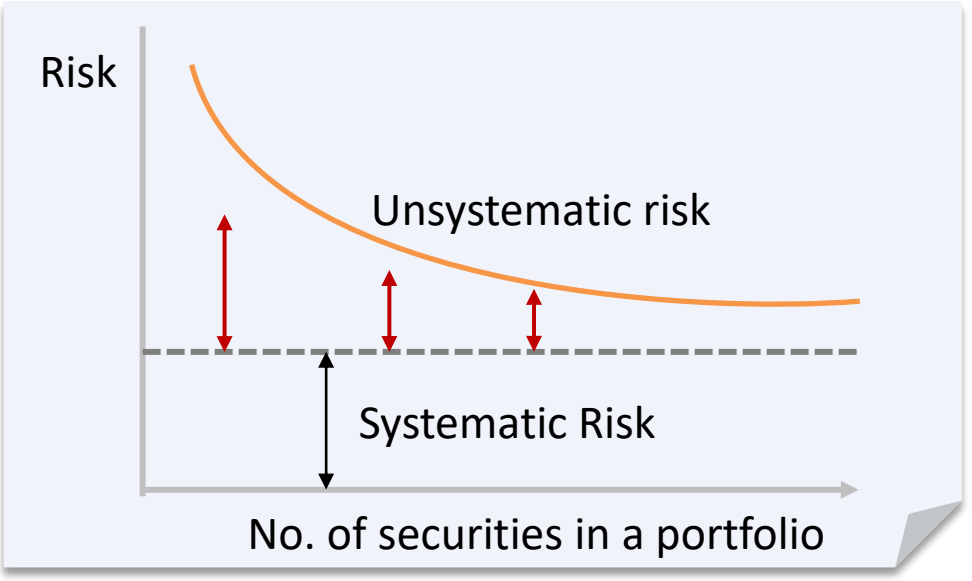
Systematic Risk

- Non-diversifiable market risk- cannot be avoided
- Examples: inflation risk, interest rate risk etc

Non-Systematic Risk

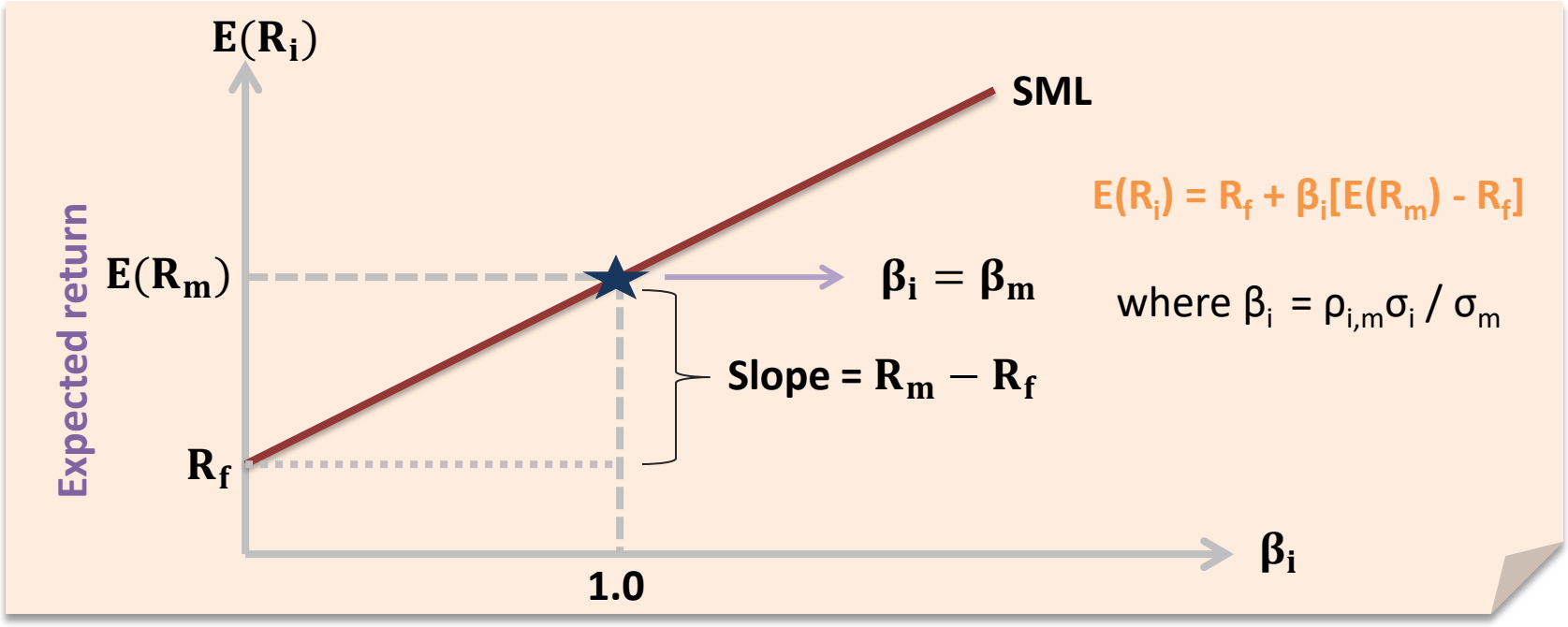
- Asset specific risk- can be diversified away
- Examples: Employee strikes, CEO resignation etc

- Investors are ONLY compensated for bearing **systematic risk**.



Security Market Line & CAPM

- A representation of CAPM with Beta reflecting systematic risk
- Similar to CML: y-intercept = R_f ; market risk premium = slope
- All properly priced securities lie on the SML



Security Market Line & CAPM

Example 2

An overvalued security would most likely plot:

A. Below the Security Market Line (SML)

B. On the Security Market Line (SML)

C. Above the Security Market Line (SML)

Solution

The correct answer is A.

If the security lies above the SML, it is underpriced (go long).

If the security lies below the SML, it is overpriced (go short).