Principles of Corporate Finance

Seventh Edition

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Slides by

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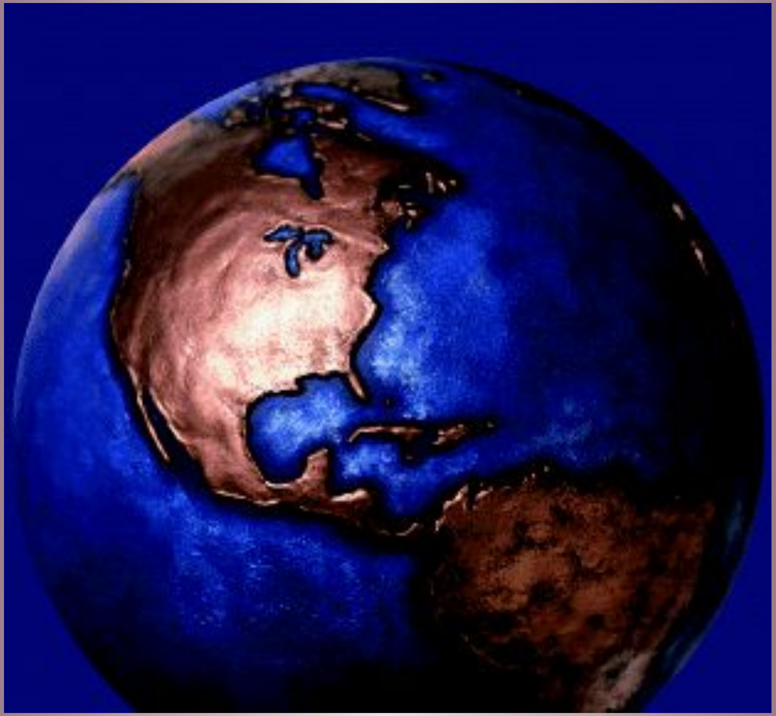
Chapter 8

Risk and Return



McGraw Hill/Irwin

Topics Covered

- Markowitz Portfolio Theory
- Risk and Return Relationship
- Testing the CAPM
- CAPM Alternatives

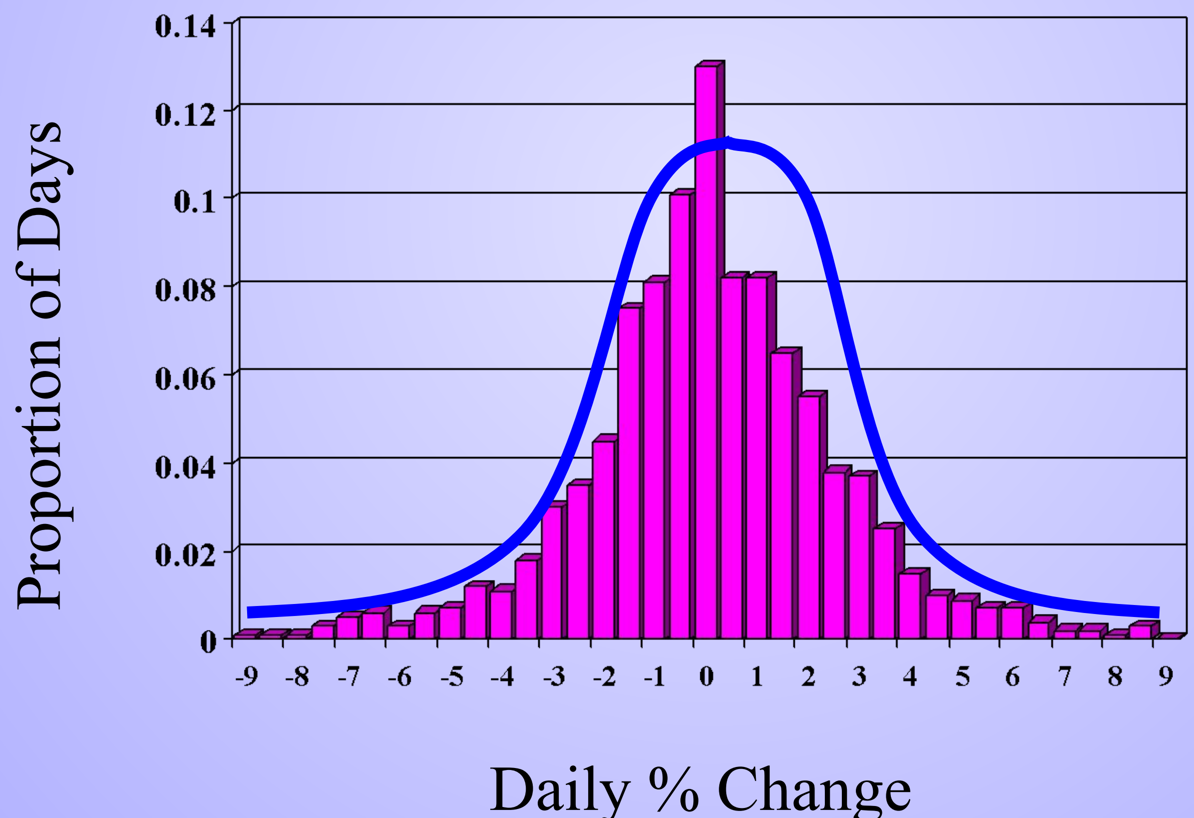
Markowitz Portfolio Theory

- Combining stocks into portfolios can reduce standard deviation, below the level obtained from a simple weighted average calculation.
- Correlation coefficients make this possible.
- The various weighted combinations of stocks that create this standard deviations constitute the set of ***efficient portfolios***.

Markowitz Portfolio Theory

Price changes vs. Normal distribution

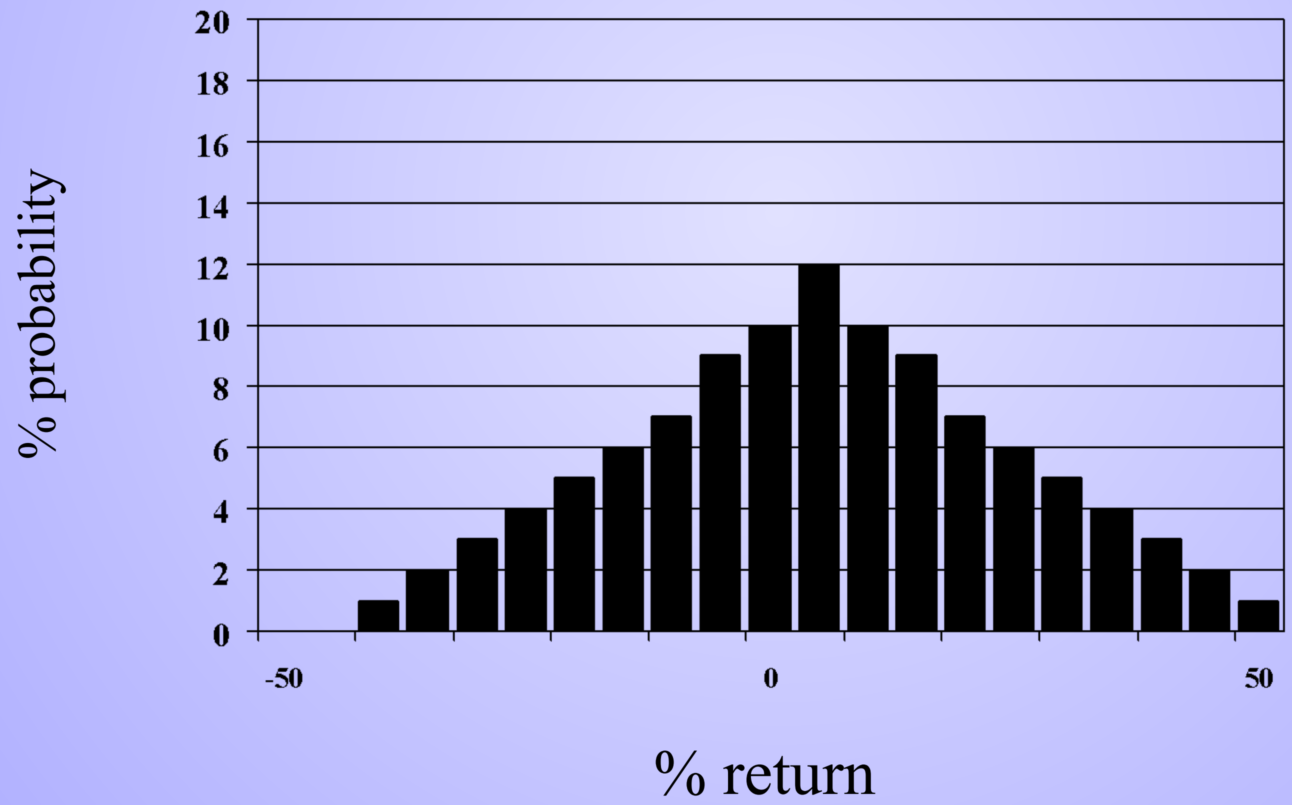
Microsoft - Daily % change 1990-2001



Markowitz Portfolio Theory

Standard Deviation VS. Expected Return

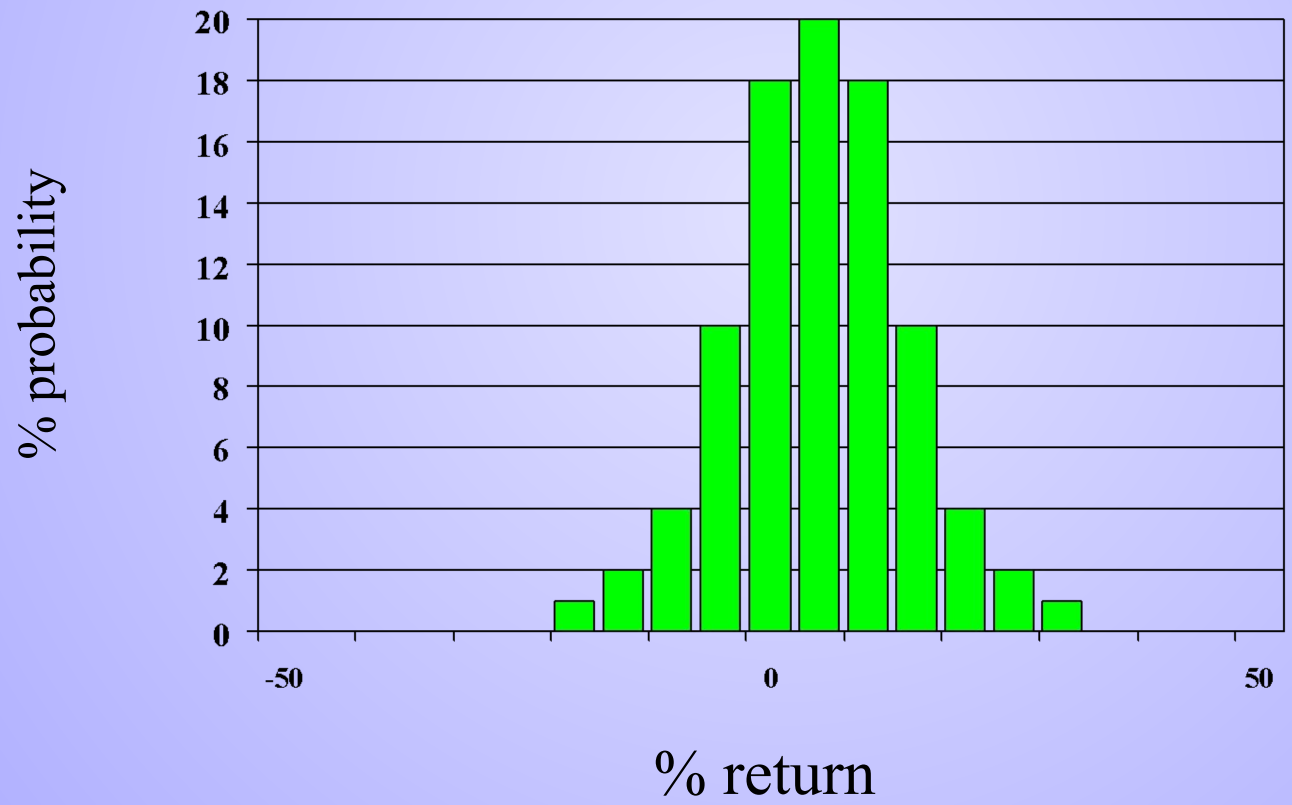
Investment A



Markowitz Portfolio Theory

Standard Deviation VS. Expected Return

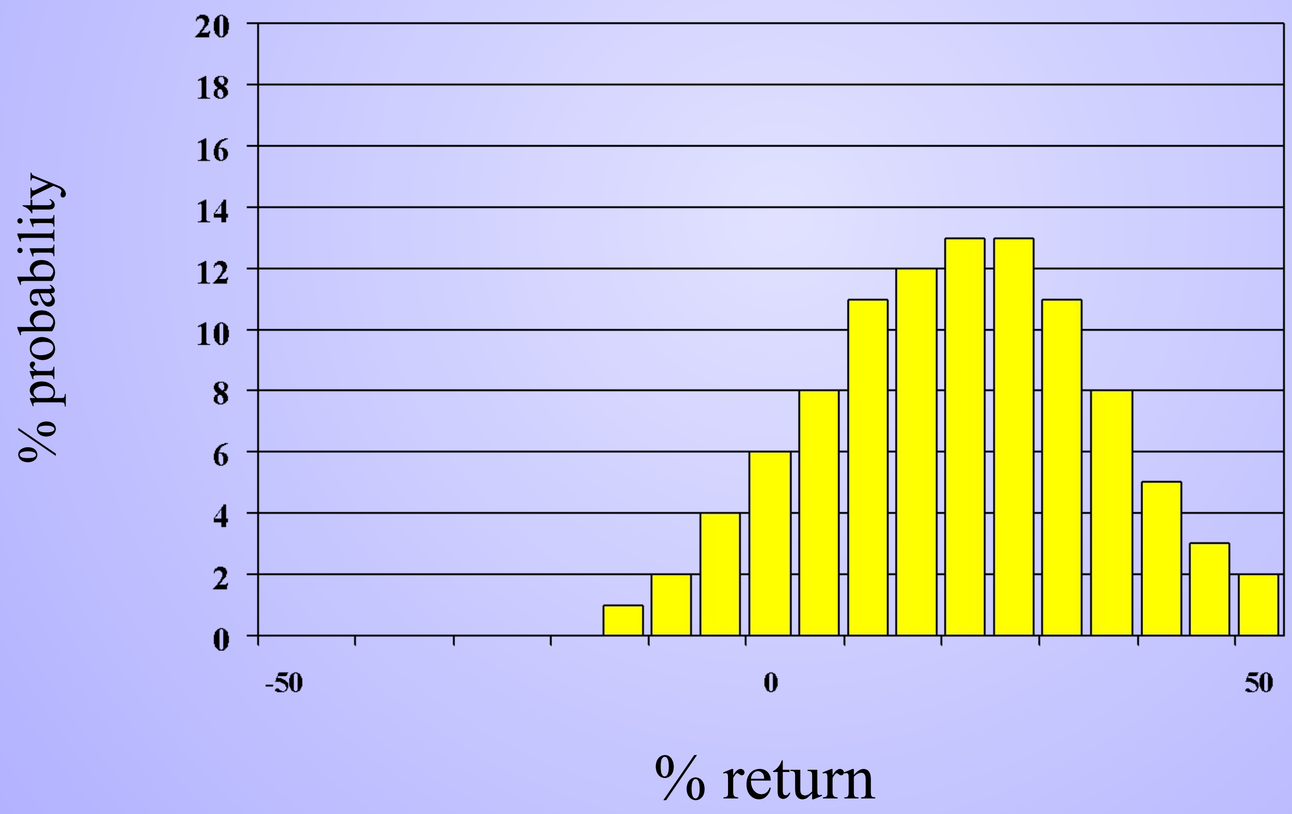
Investment B



Markowitz Portfolio Theory

Standard Deviation VS. Expected Return

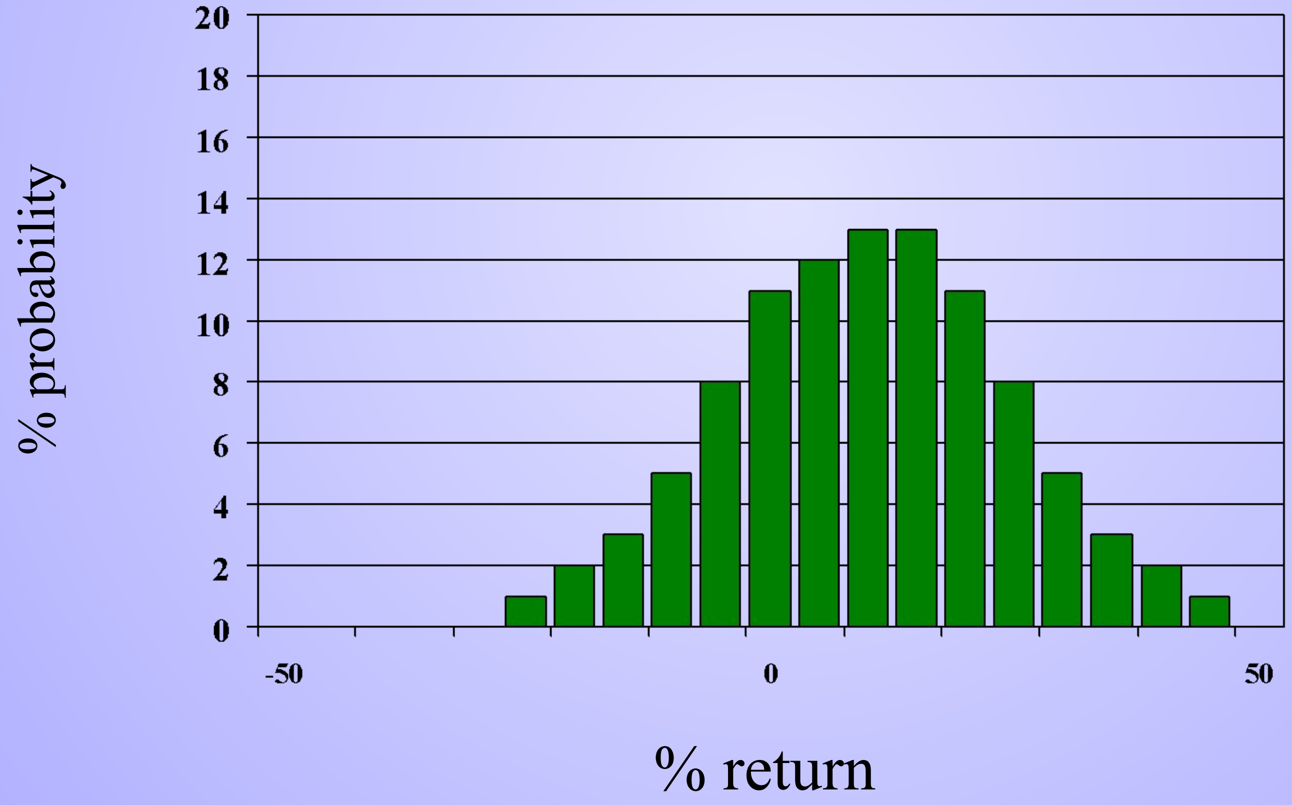
Investment C



Markowitz Portfolio Theory

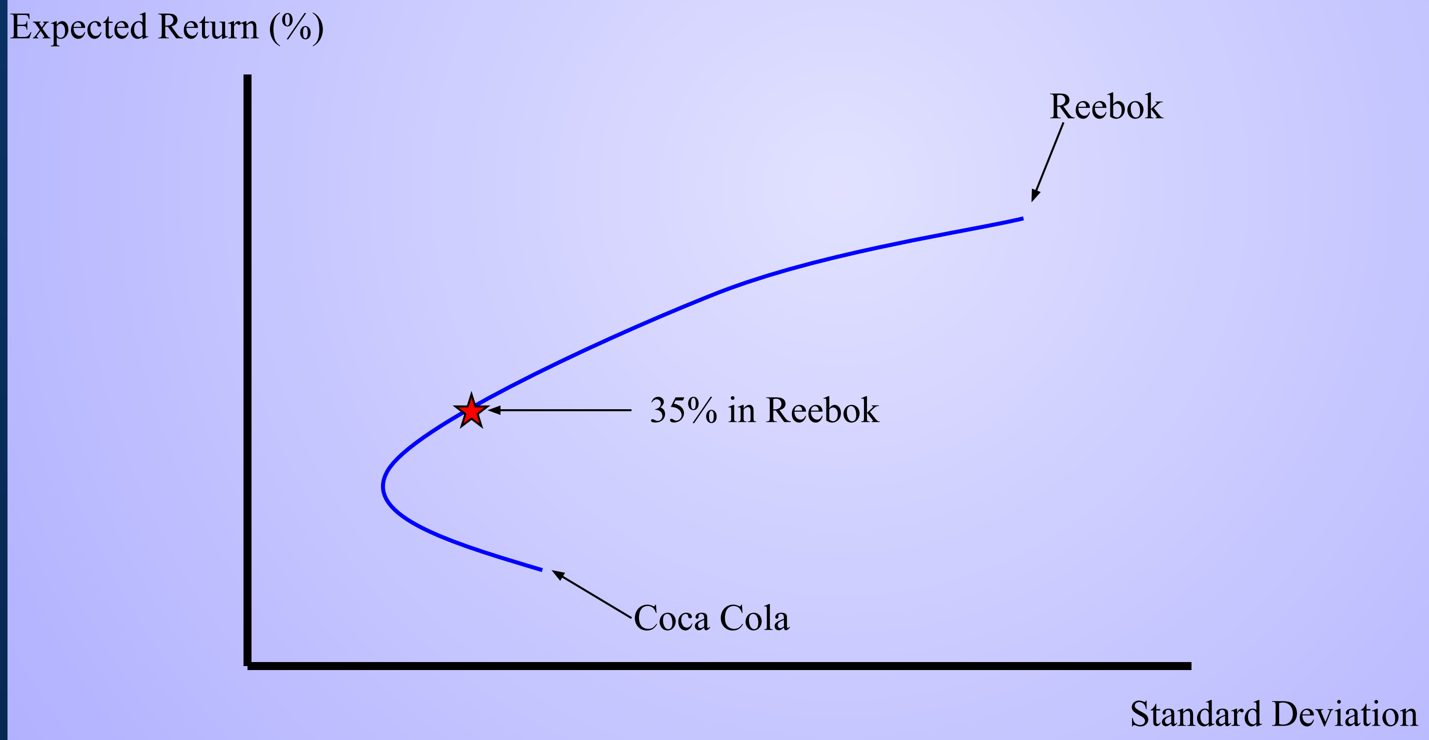
Standard Deviation VS. Expected Return

Investment D



Markowitz Portfolio Theory

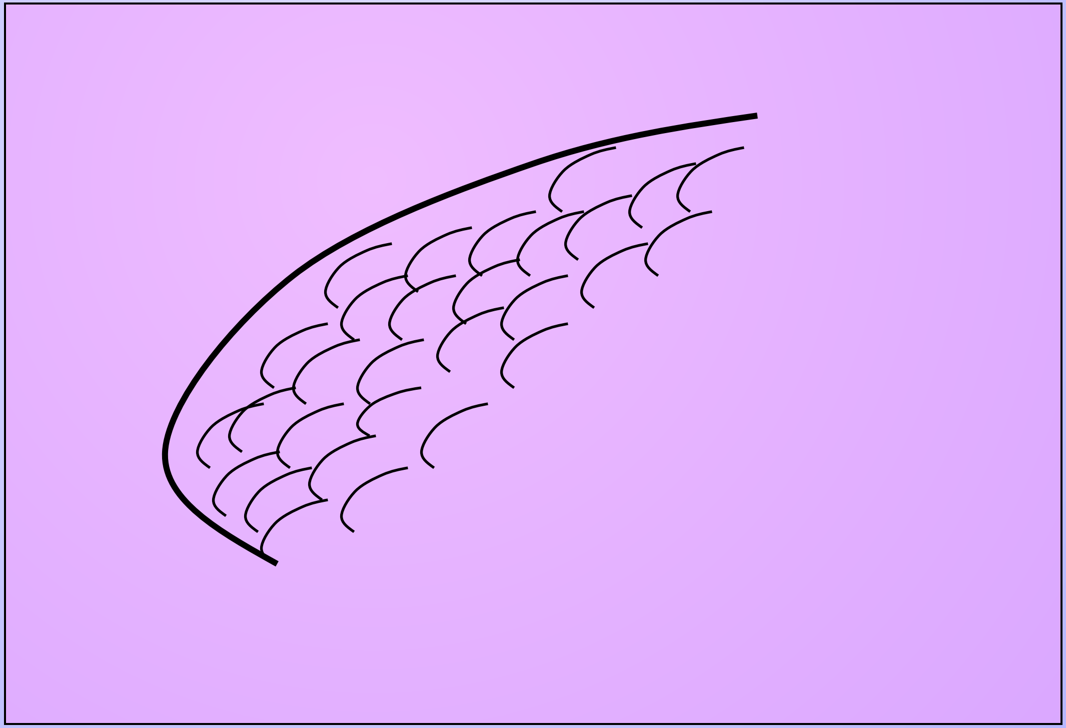
- Expected Returns and Standard Deviations vary given different weighted combinations of the stocks



Efficient Frontier

- Each half egg shell represents the possible weighted combinations for two stocks.
- The composite of all stock sets constitutes the efficient frontier

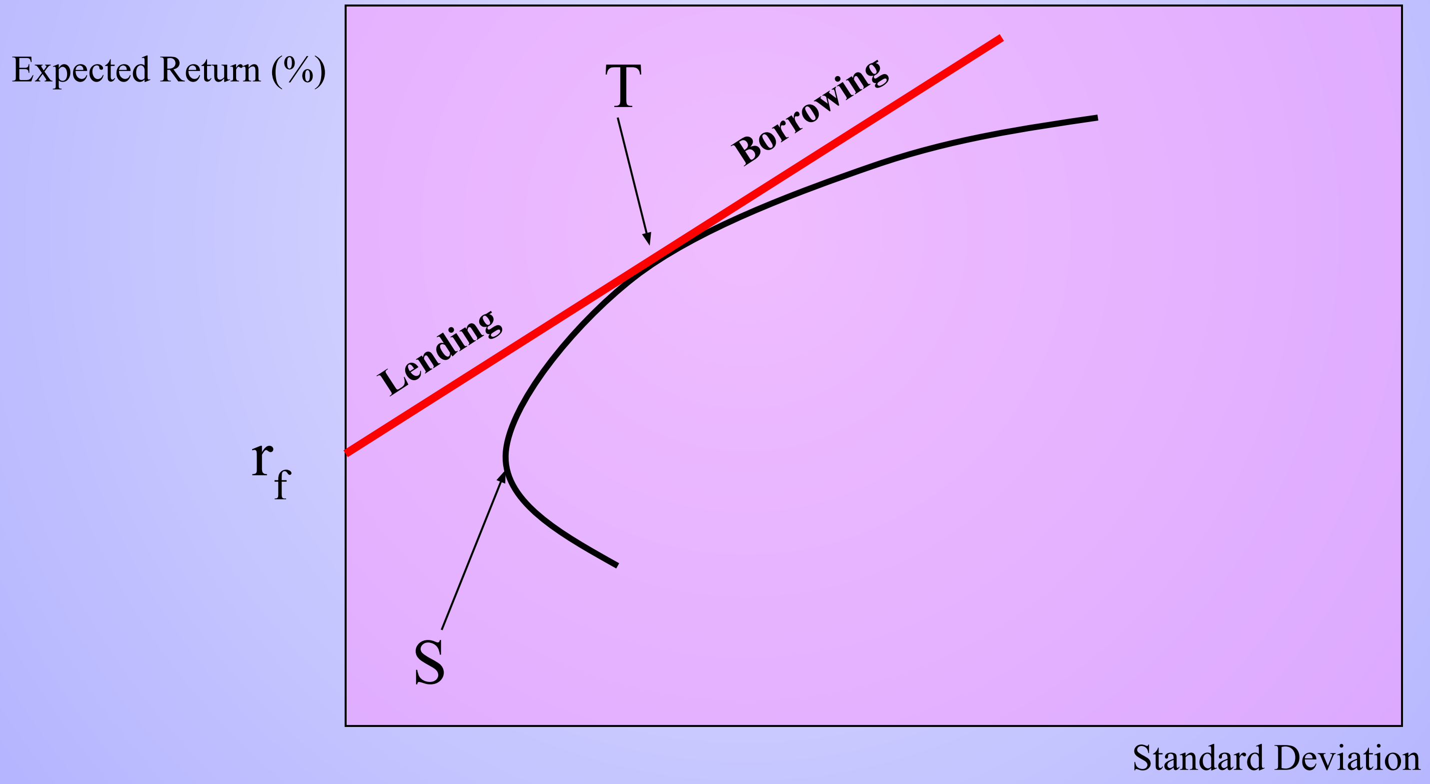
Expected Return (%)



Standard Deviation

Efficient Frontier

•Lending or Borrowing at the risk free rate (r_f) allows us to exist outside the efficient frontier.



Efficient Frontier

Example   Correlation Coefficient = .4

Stocks	σ	% of Portfolio	Avg Return
ABC Corp	28	60%	15%
Big Corp	42	40%	21%

Standard Deviation = weighted avg = 33.6

Standard Deviation = Portfolio = 28.1

Return = weighted avg = Portfolio = 17.4%

Efficient Frontier

Example   Correlation Coefficient = .4

Stocks	σ	% of Portfolio	Avg Return
ABC Corp	28	60%	15%
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Standard Deviation = weighted avg = 33.6

Standard Deviation = Portfolio = 28.1

Return = weighted avg = Portfolio = 17.4%

Let's Add stock New Corp to the portfolio

Efficient Frontier

Example			Correlation Coefficient = .3
Stocks	σ	% of Portfolio	Avg Return
Portfolio	28.1	50%	17.4%
New Corp	*30*	*50%*	*19%*

NEW Standard Deviation = weighted avg = 31.80

NEW Standard Deviation = Portfolio = 23.43

NEW Return = weighted avg = Portfolio = 18.20%

Efficient Frontier

Example Correlation Coefficient = .3

Stocks	σ	% of Portfolio	Avg Return
Portfolio	28.1	50%	17.4%
New Corp	30	50%	19%

NEW Standard Deviation = weighted avg = 31.80

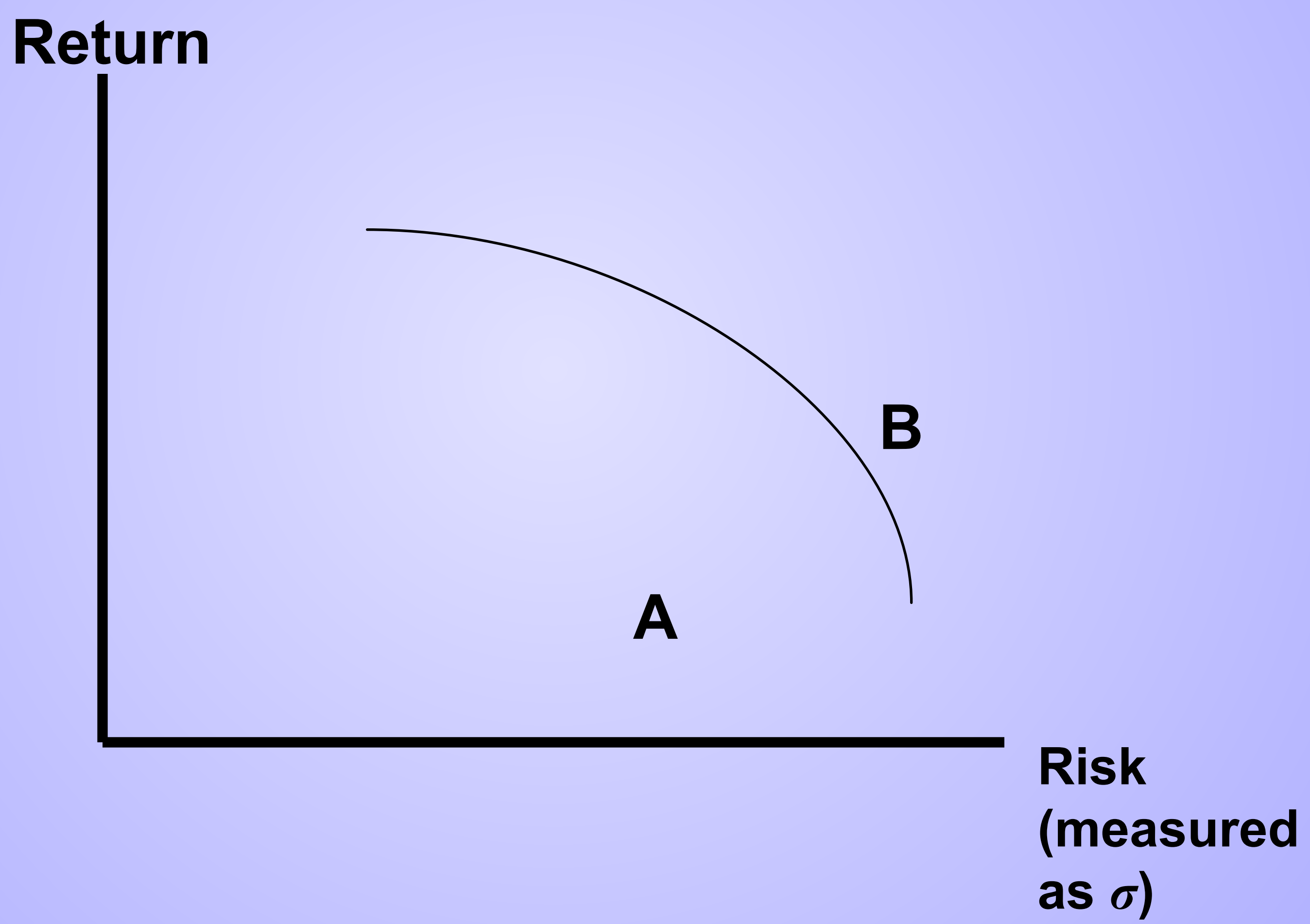
NEW Standard Deviation = Portfolio = 23.43

NEW Return = weighted avg = Portfolio = 18.20%

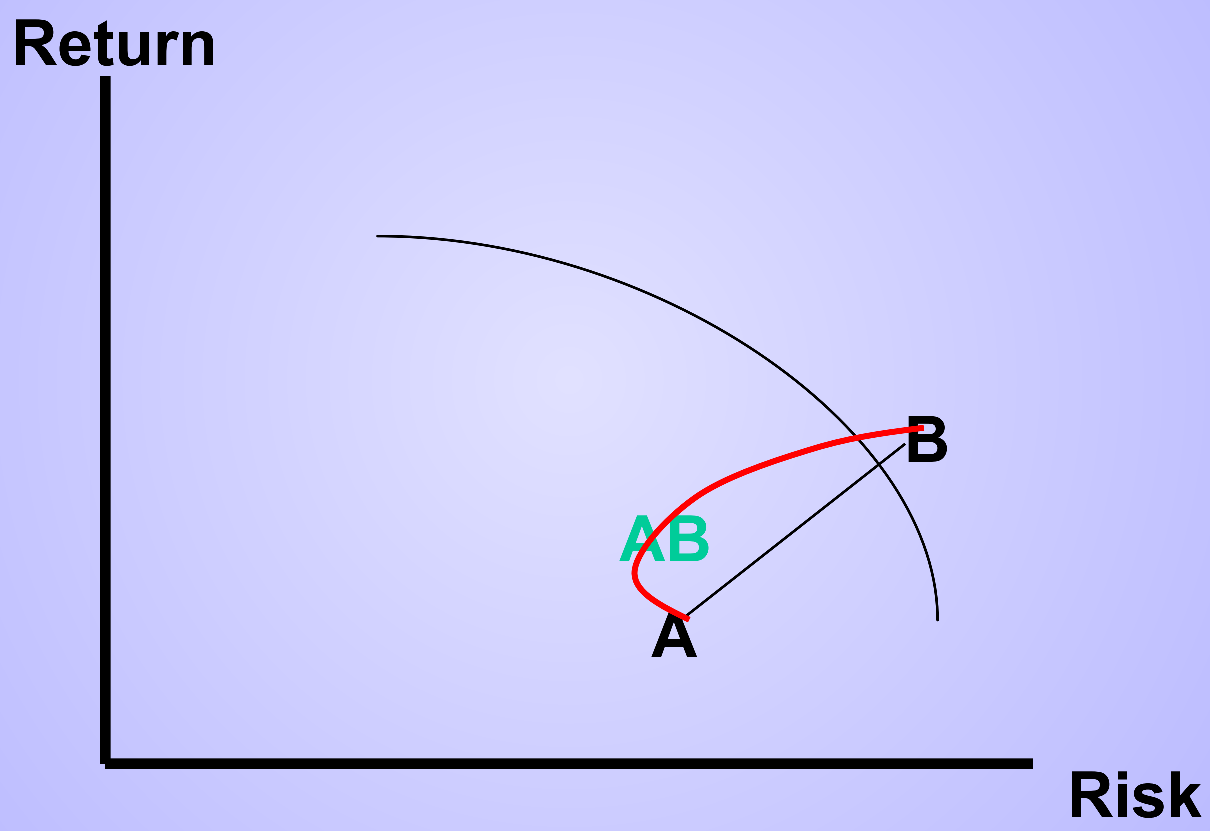
NOTE: Higher return & Lower risk

How did we do that? DIVERSIFICATION

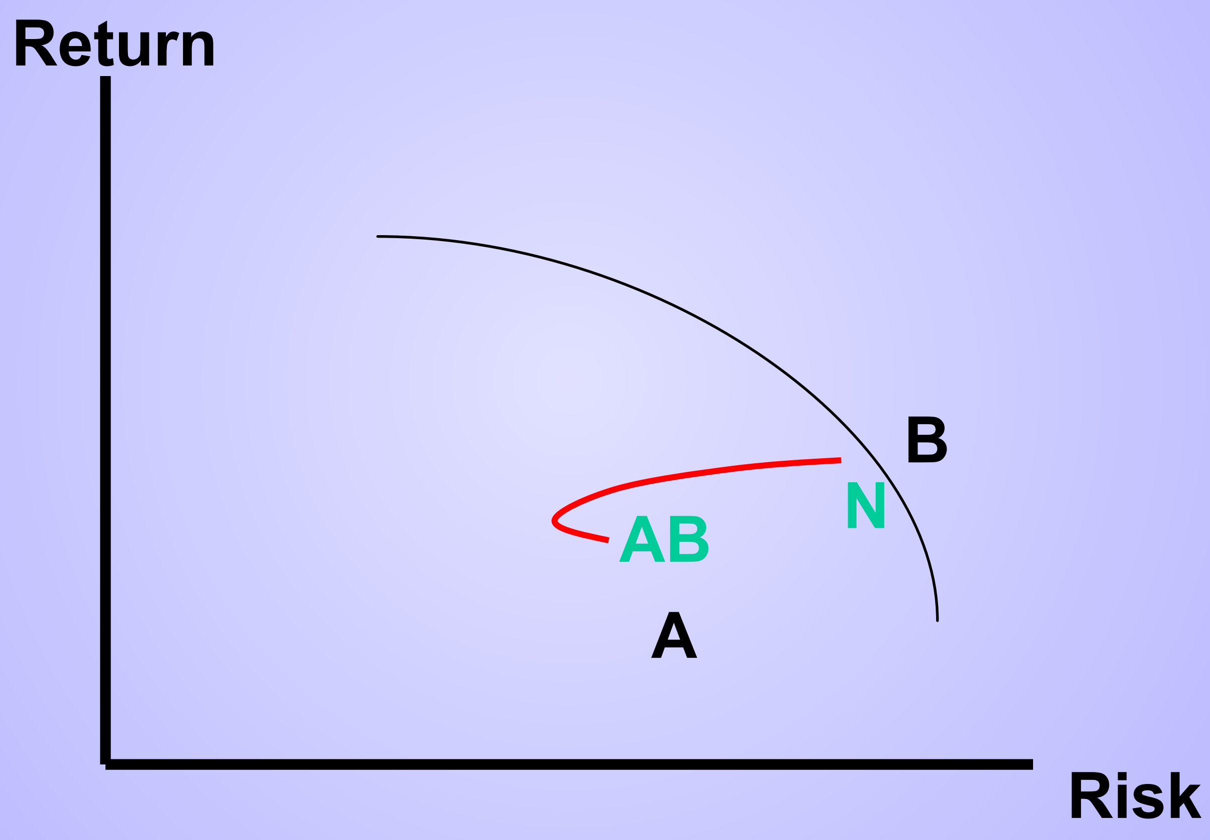
Efficient Frontier



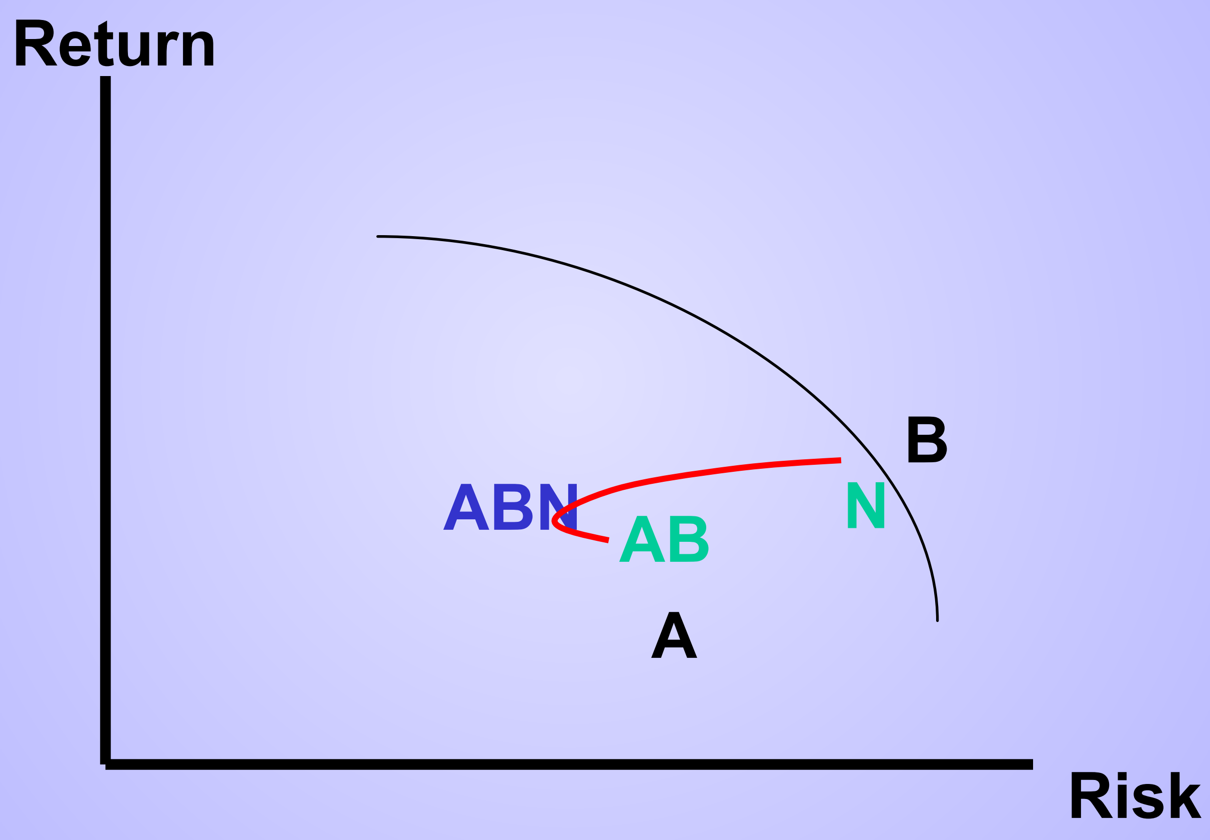
Efficient Frontier



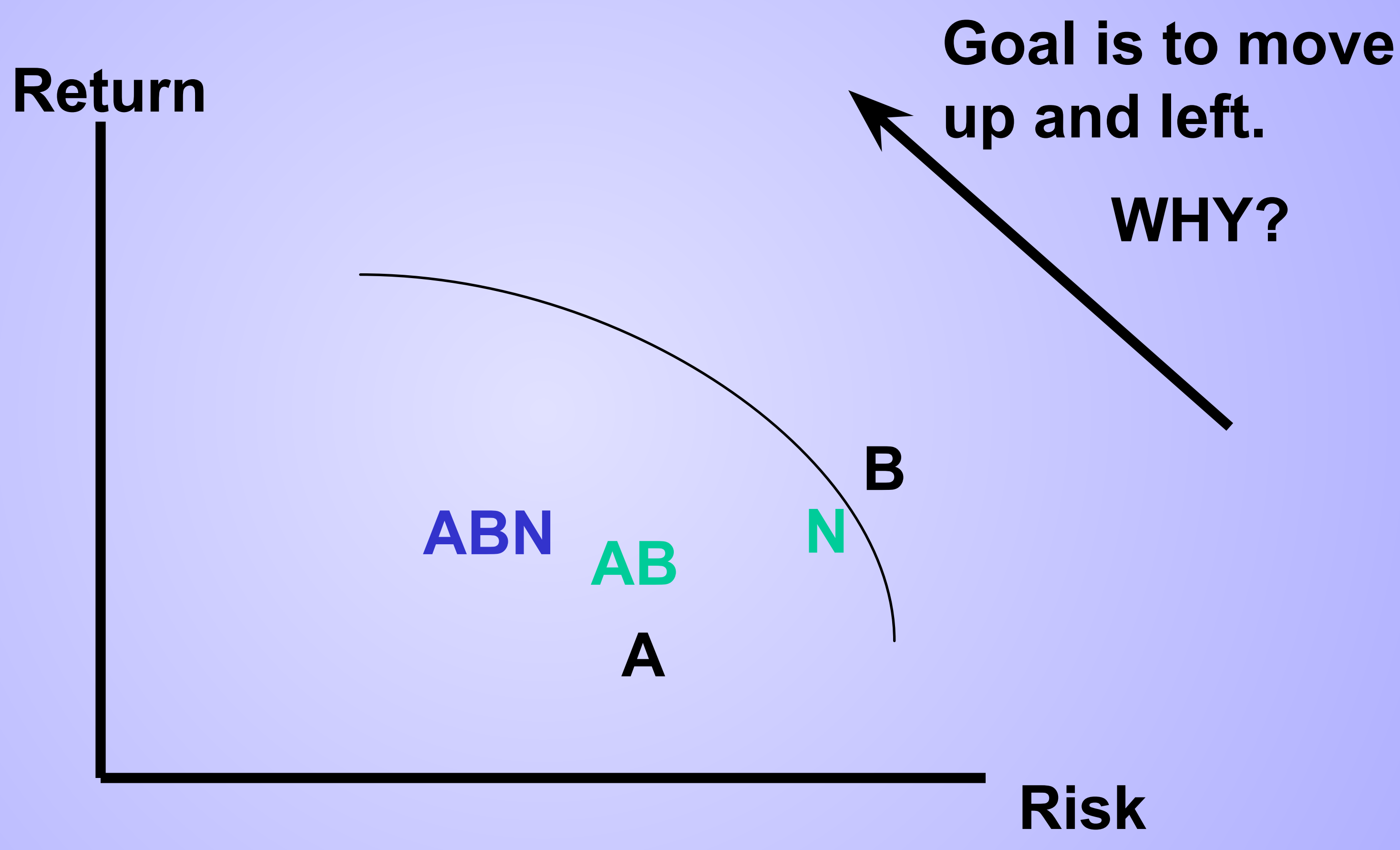
Efficient Frontier



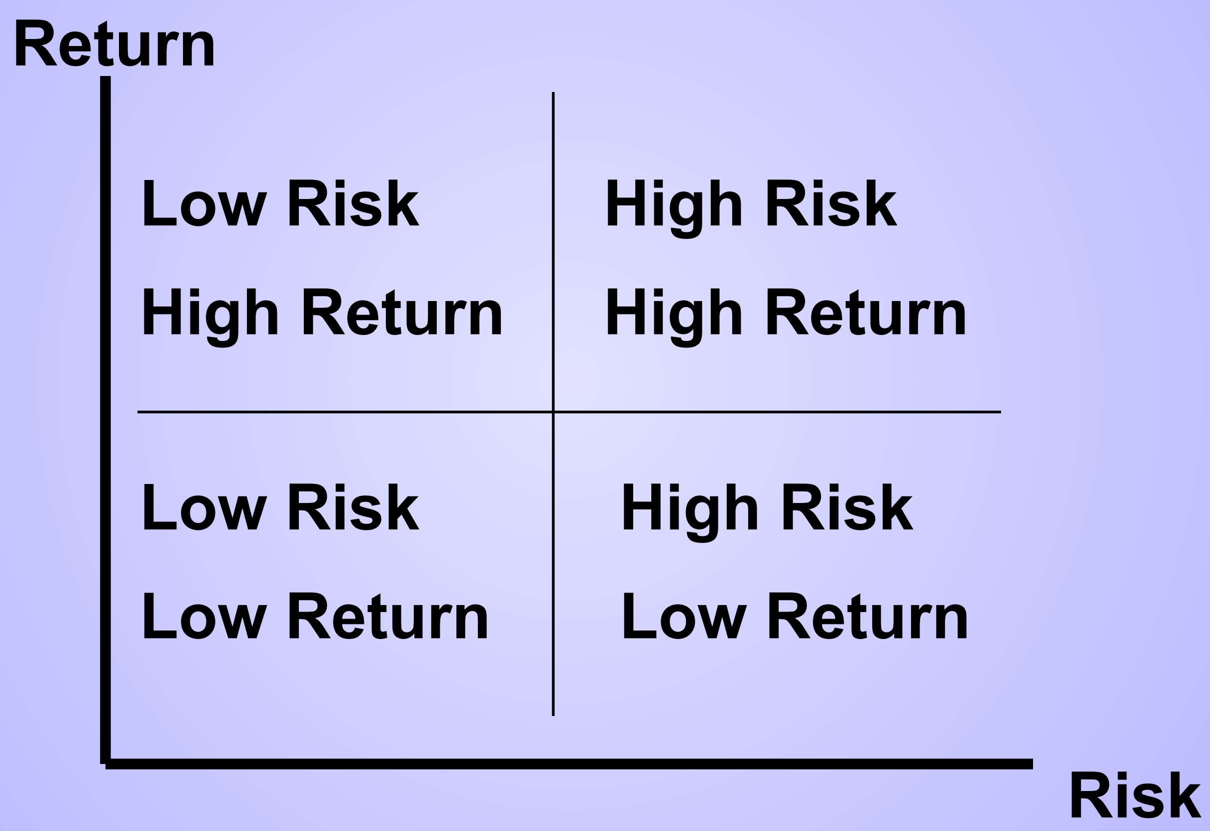
Efficient Frontier



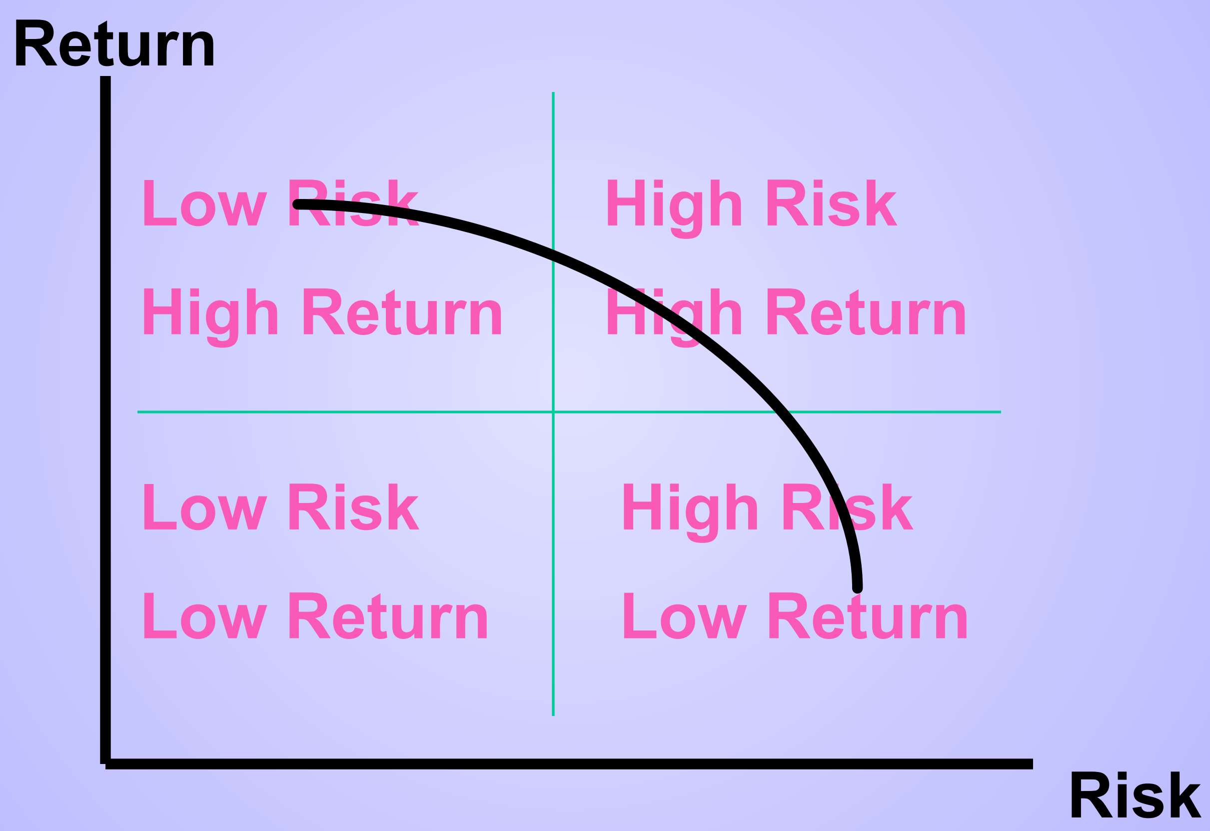
Efficient Frontier



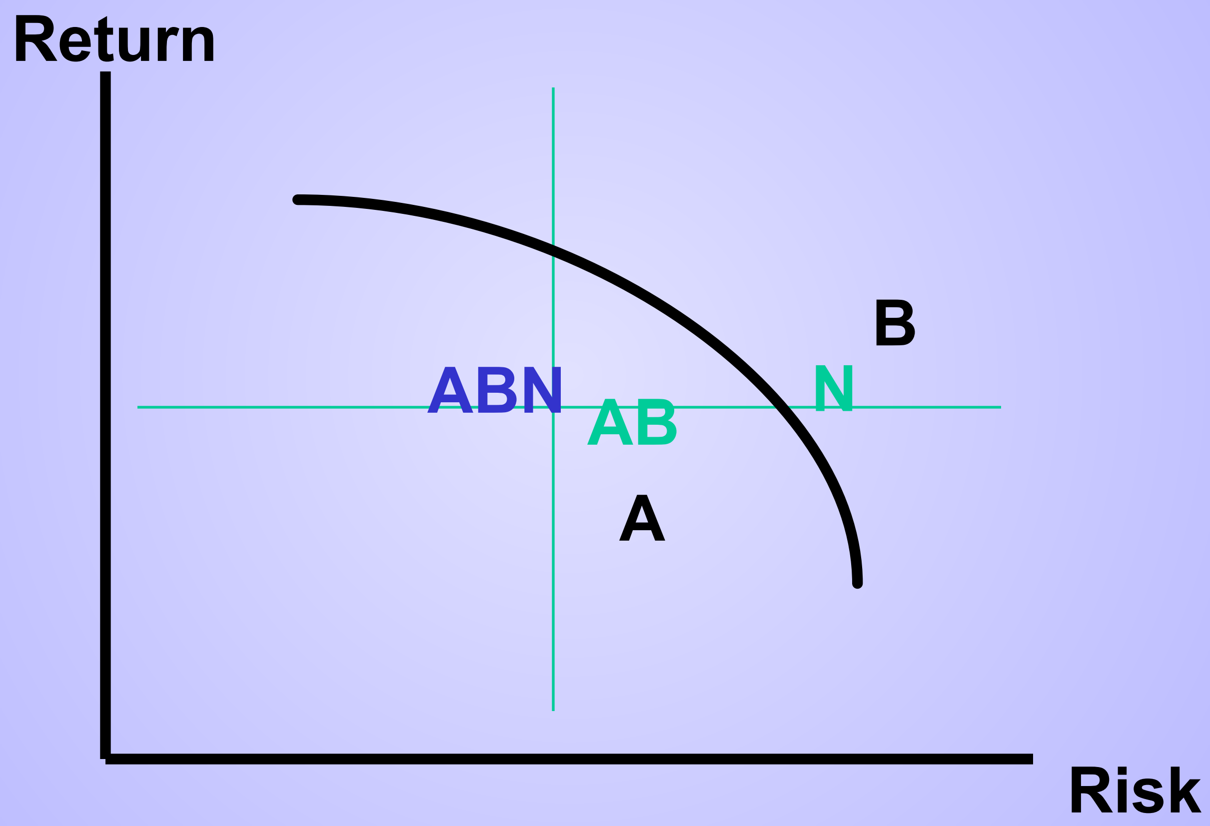
Efficient Frontier



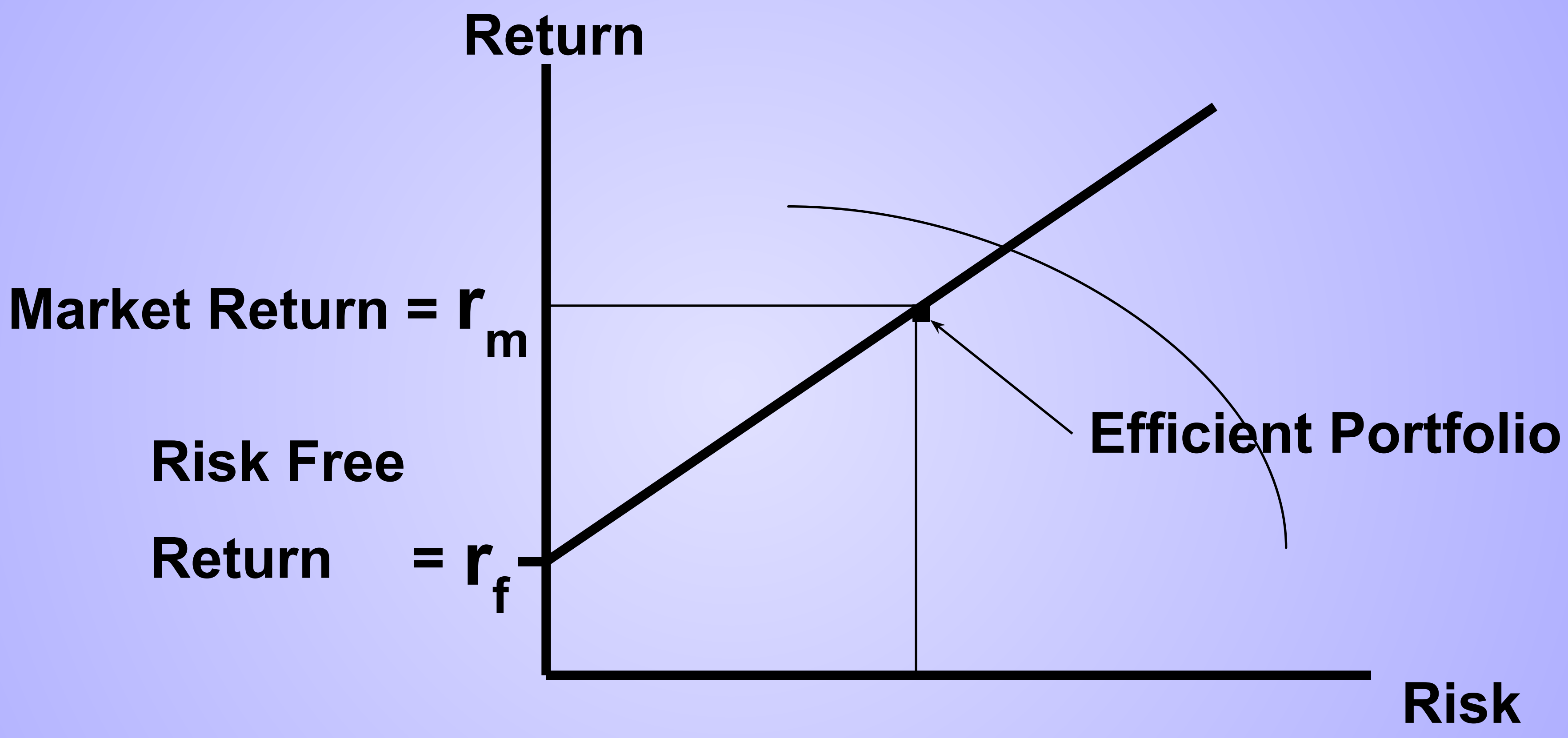
Efficient Frontier



Efficient Frontier



Security Market Line



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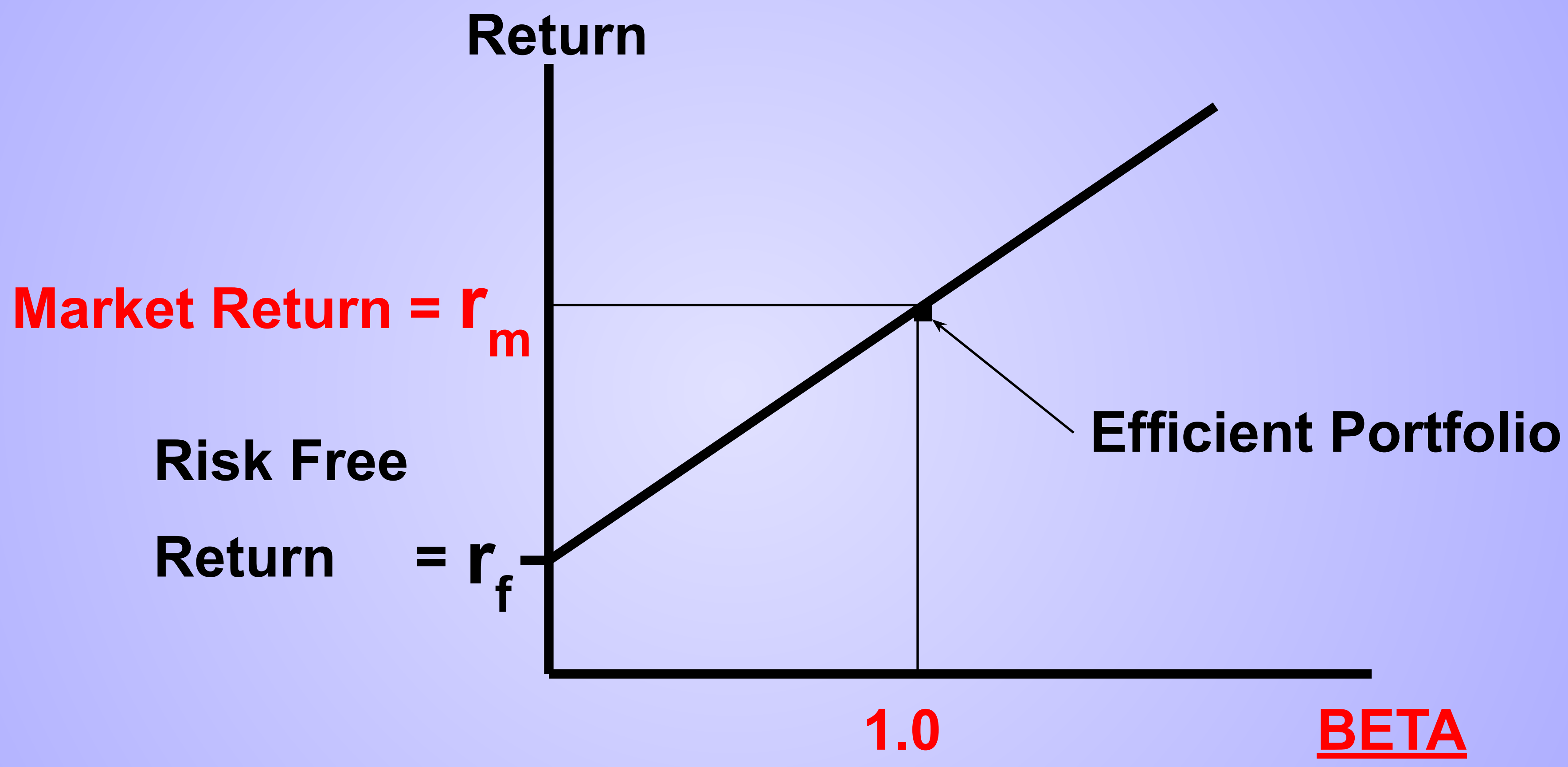

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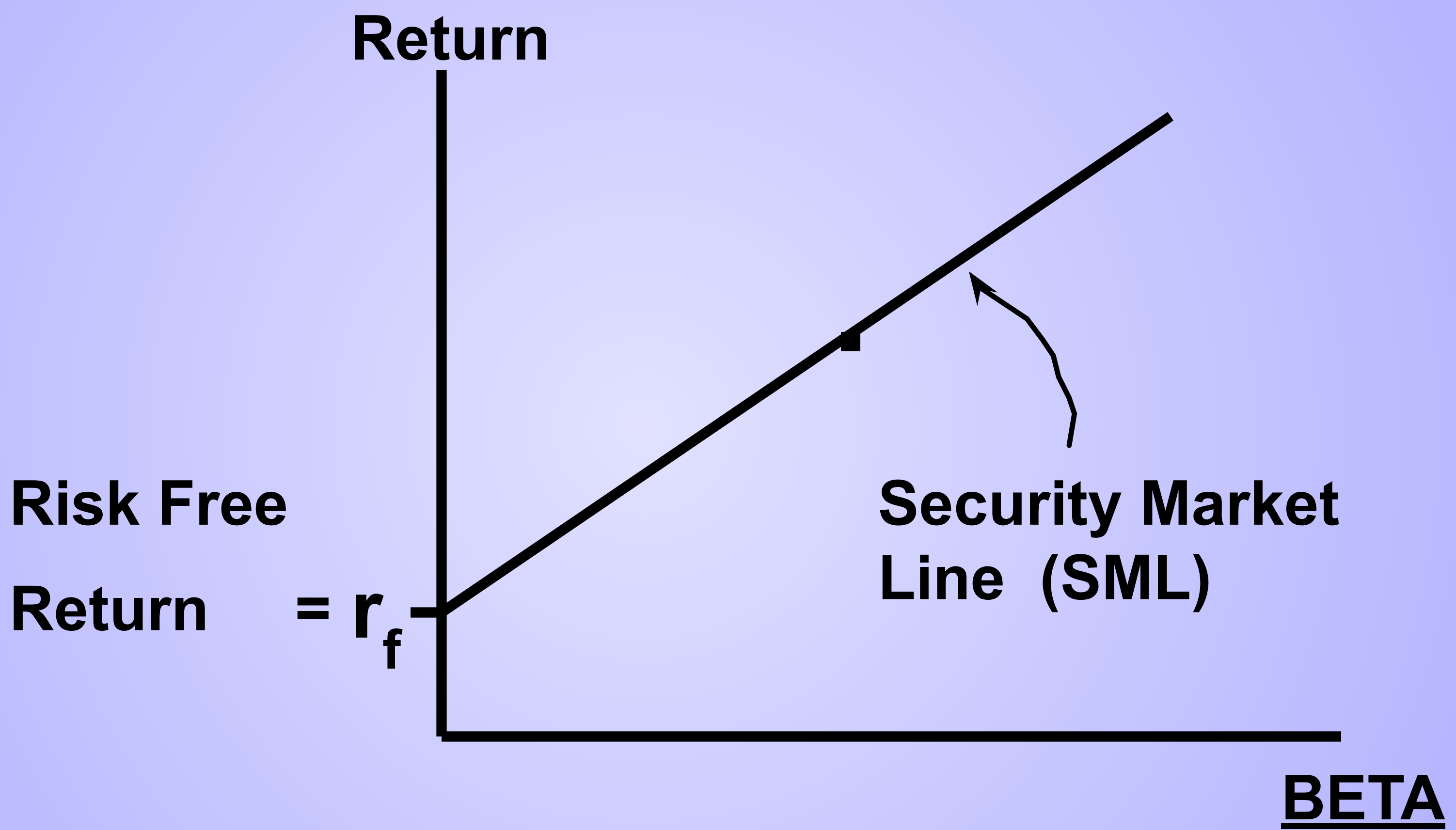

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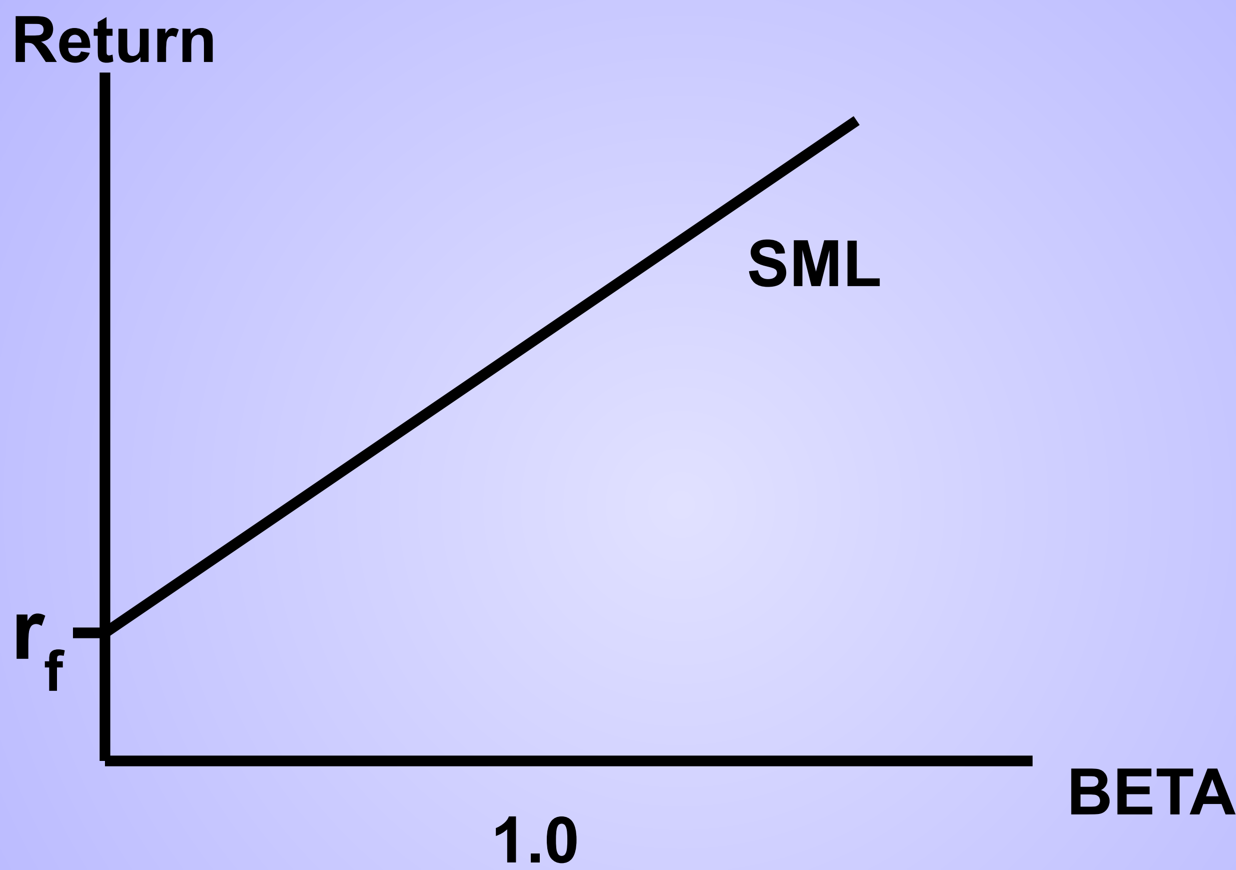


SML Equation = $r_f + B\,(r_m - r_f)$

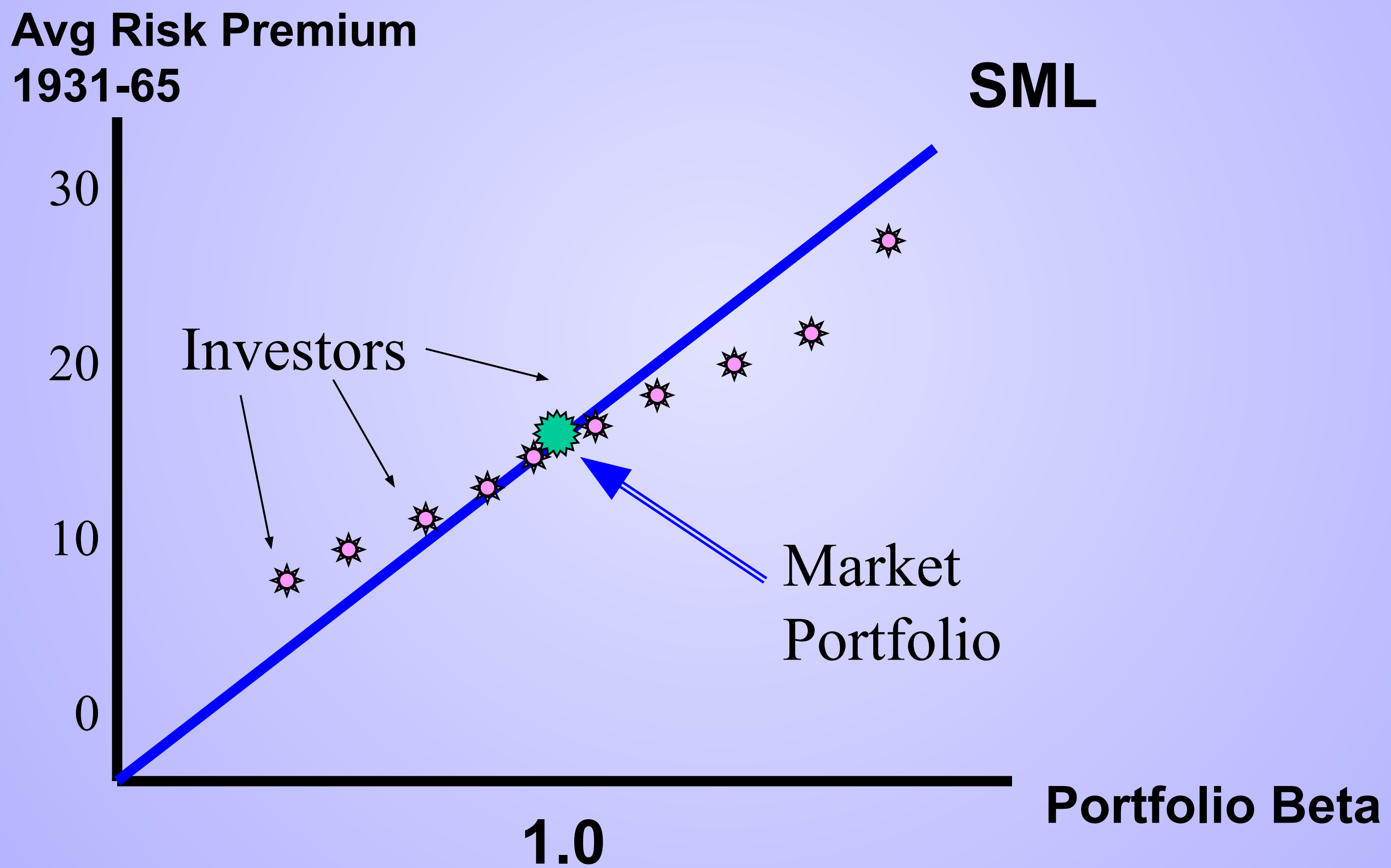
Capital Asset Pricing Model

$$R = r_f + B\,(r_m - r_f)$$

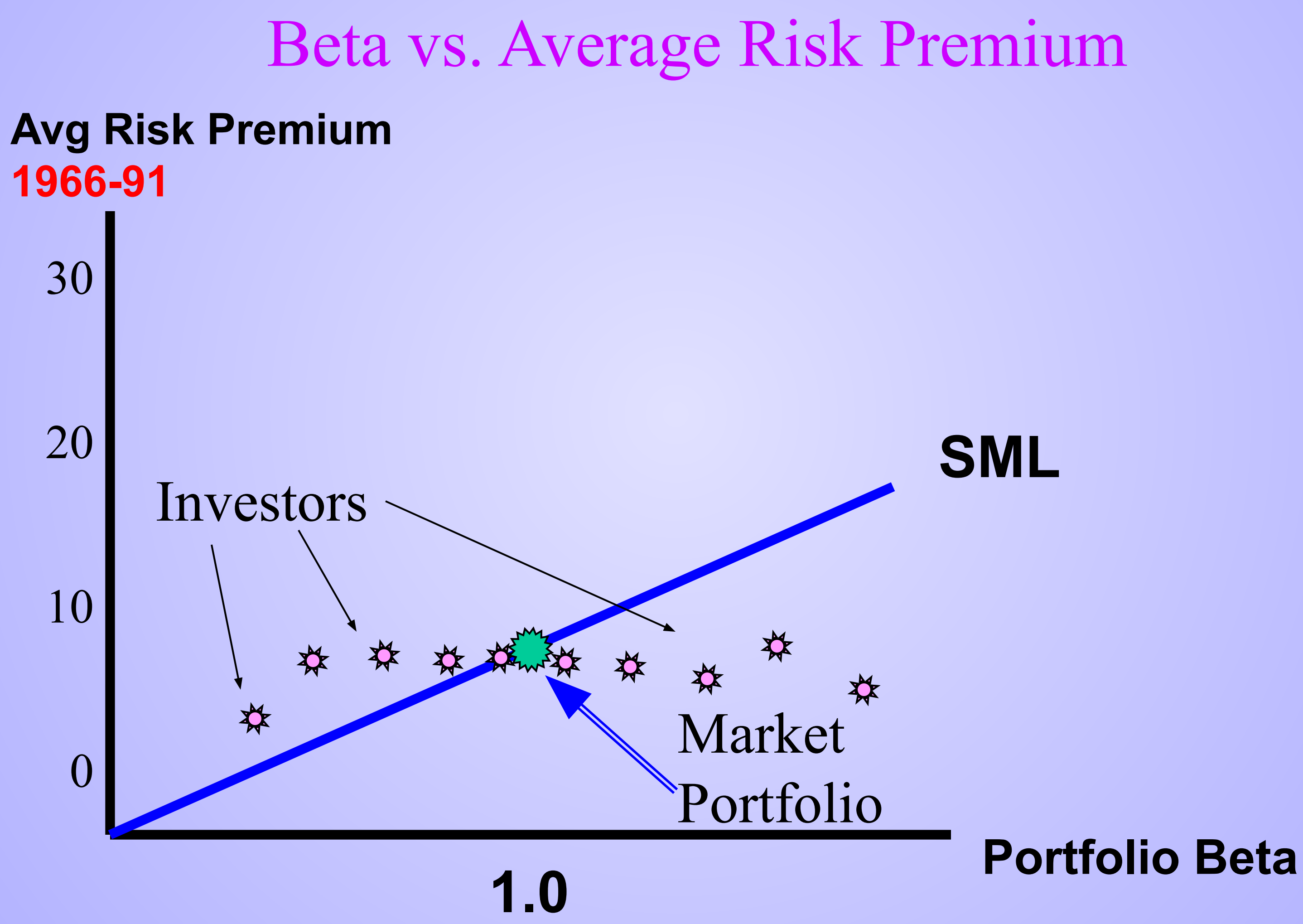
CAPM

Testing the CAPM

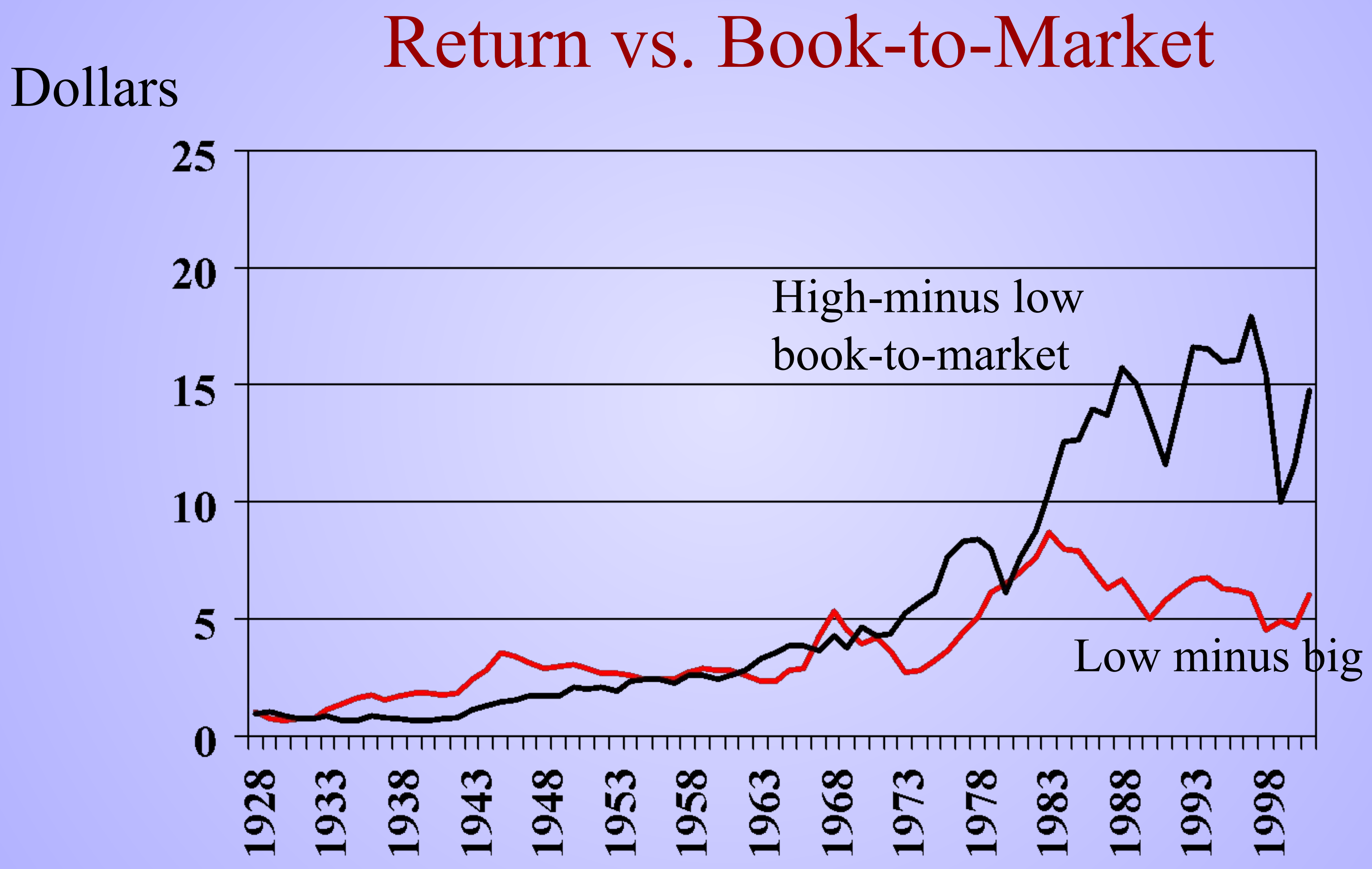
Beta vs. Average Risk Premium



Testing the CAPM



Testing the CAPM



http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Consumption Betas vs Market Betas

Stocks
(and other risky
assets)

Market risk
makes wealth
uncertain.

Wealth = market
portfolio

Standard
CAPM

Stocks
(and other risky
assets)

Wealth is uncertain

Wealth

Consumption is uncertain

Consumption

Consumption
CAPM

Arbitrage Pricing Theory

Alternative to CAPM

Expected Risk

Premium = $r - r_f$

$$= B_{factor1}(r_{factor1} - r_f) + B_{f2}(r_{f2} - r_f) + \ldots$$

$$\text{Return} = a + b_{factor1}(r_{factor1}) + b_{f2}(r_{f2}) + \ldots$$

Arbitrage Pricing Theory

Estimated risk premiums for taking on risk factors (1978-1990)

Factor	Estimated Risk Premium $(r_{\text{factor}} - r_f)$
Yield spread	5.10%
Interest rate	-.61
Exchange rate	-.59
Real GNP	.49
Inflation	-.83
Mrket	6.36