

Chapter 11



Risk, Return, and Capital Budgeting

Topics Covered

- ➡ Measuring Market Risk
- ➡ Portfolio Betas
- ➡ Risk and Return
- ➡ CAPM and Expected Return
- ➡ Capital Market Line
- ➡ Capital Budgeting and Project Risk

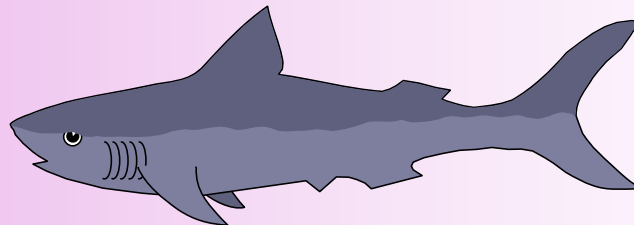
Measuring Market Risk

Market Portfolio - Portfolio of all assets in the economy. In practice a broad stock market index, such as the S&P Composite index, is used to represent the market.

Beta - Sensitivity of a stock's return to the return on the market portfolio.

Measuring Market Risk

Example – Turbot-Charged Seafood has the following % returns on its stock, relative to the listed changes in the % return on the market portfolio. The beta of Turbot-Charged Seafood can be derived from this information.



Measuring Market Risk

Example - continued

Month	Market Return %	Turbot Return %
1	+1	+ 0.8
2	+1	+1.8
3	+1	- 0.2
4	-1	-1.8
5	-1	+ 0.2
6	-1	- 0.8

Measuring Market Risk

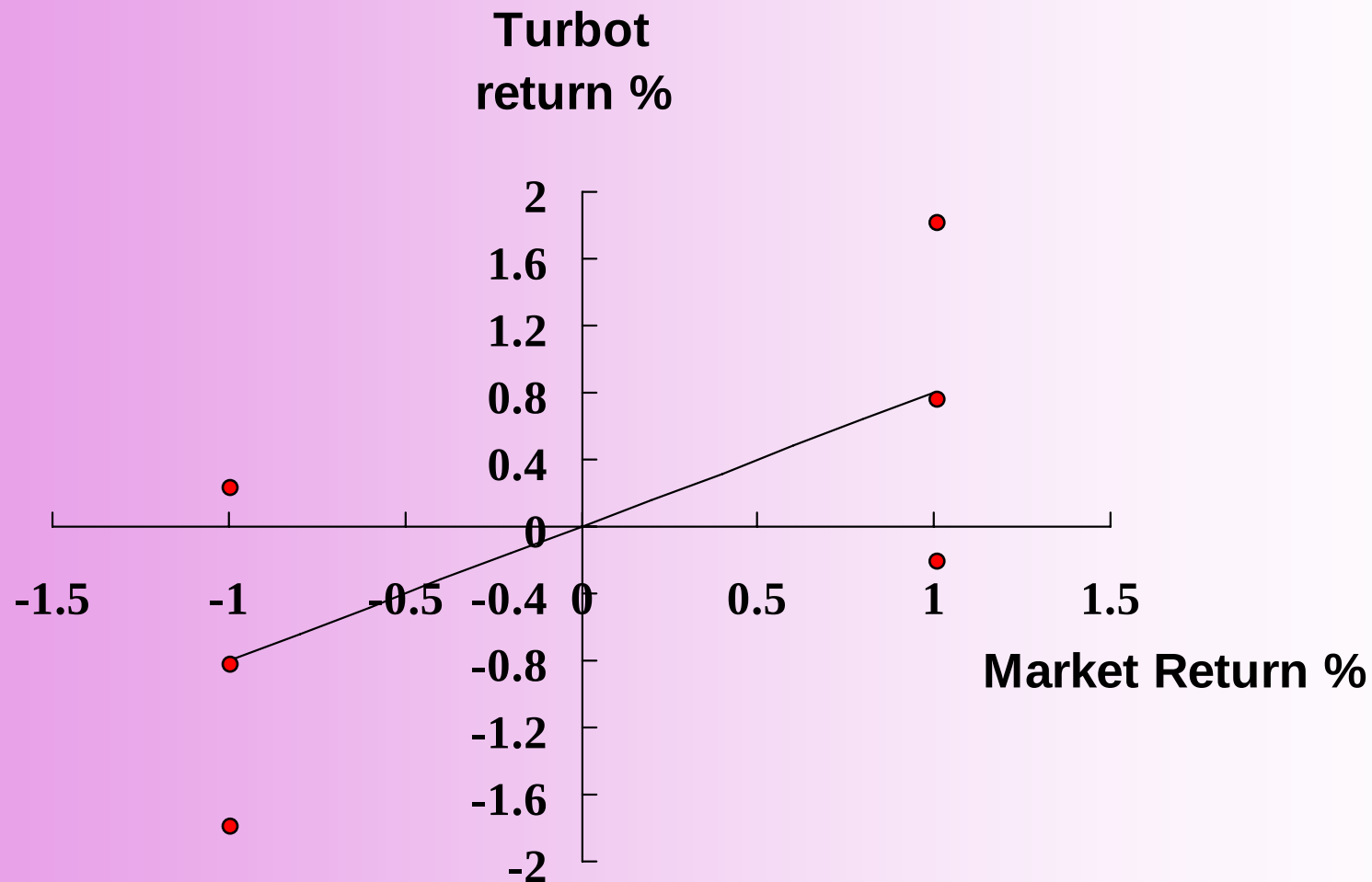
Example - continued

- ➡ When the market was up 1%, Turbo average % change was +0.8%
- ➡ When the market was down 1%, Turbo average % change was -0.8%
- ➡ The average change of 1.6 % (-0.8 to 0.8) divided by the 2% (-1.0 to 1.0) change in the market produces a beta of 0.8.

$$\beta = \frac{1.6}{2} = 0.8$$

Measuring Market Risk

Example - continued



Stock Betas

Stock	Beta
Amazon	2.49
DellComputer	1.64
Ford	1.34
GE	.97
McDonald's	.90
Boeing	.76
Wal - Mart	.51
Pfizer	.46
ExxonMobil	.41
H.J.Heinz	.30

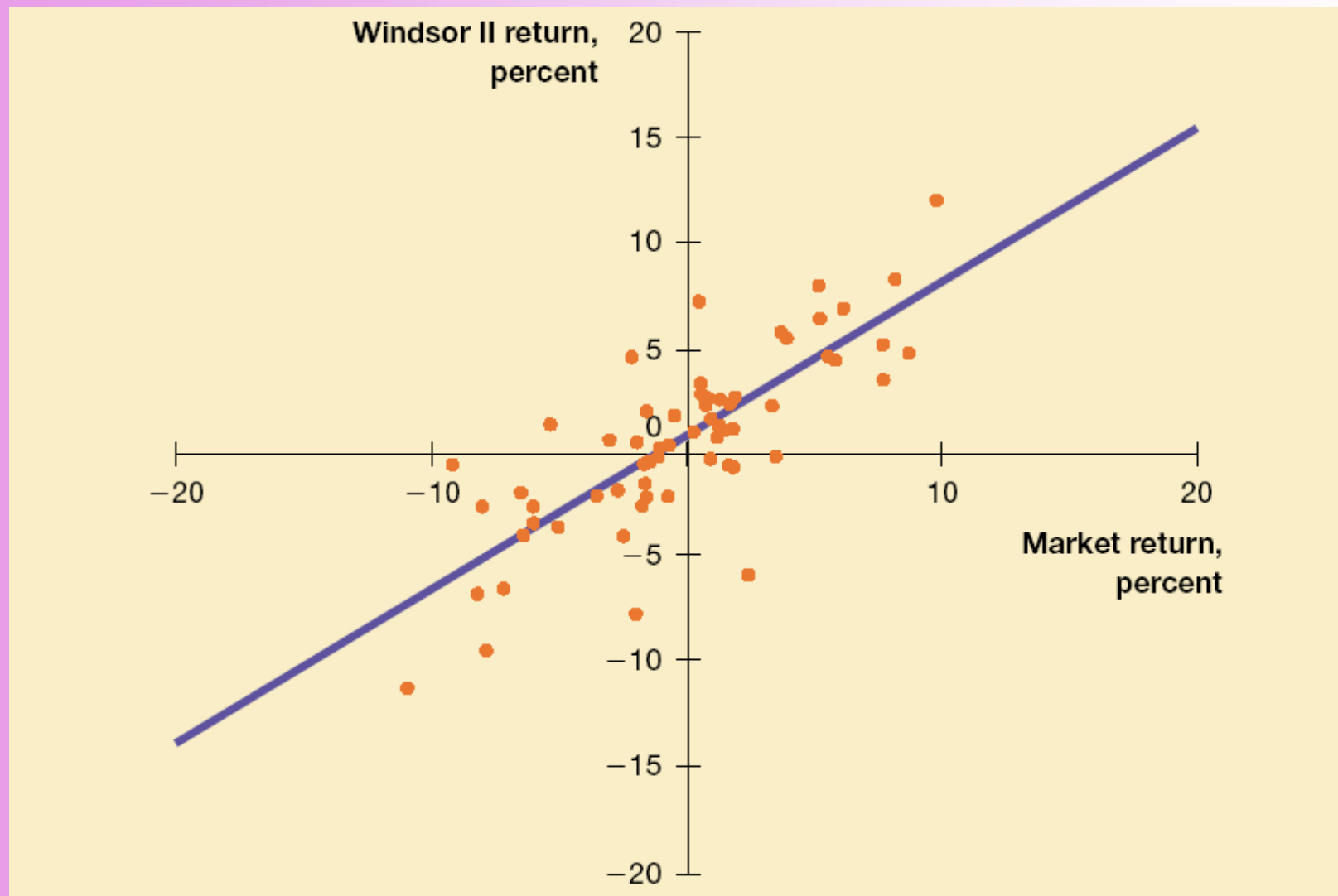


Betas calculated with
price data from
January 2001 thru
December 2004 (see
Figure 11-2 on p.299)

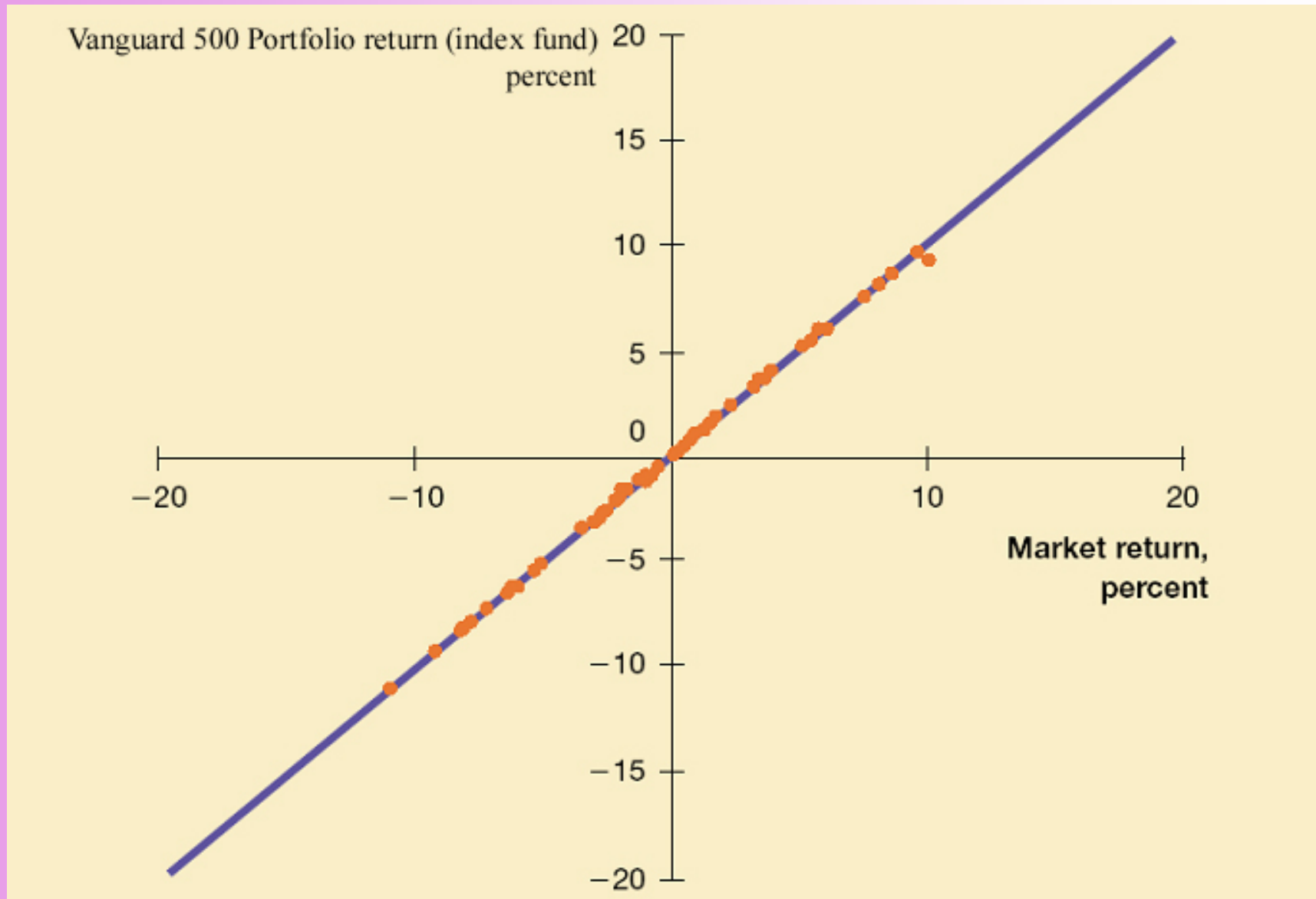
Portfolio Betas

- ➡ Common stock returns can be divided into two parts:
 - ➔ The part explained by market returns (market risk)
 - ➔ The part due to news that is specific to the firm (unique risk)
- ➡ Diversification decreases variability from unique risk, but not from market risk.
- ➡ The beta of your portfolio will be an average of the betas of the securities in the portfolio (p.300)
- ➡ If you owned all of the S&P Composite Index stocks, you would have an average beta of 1.0

Risk and Return

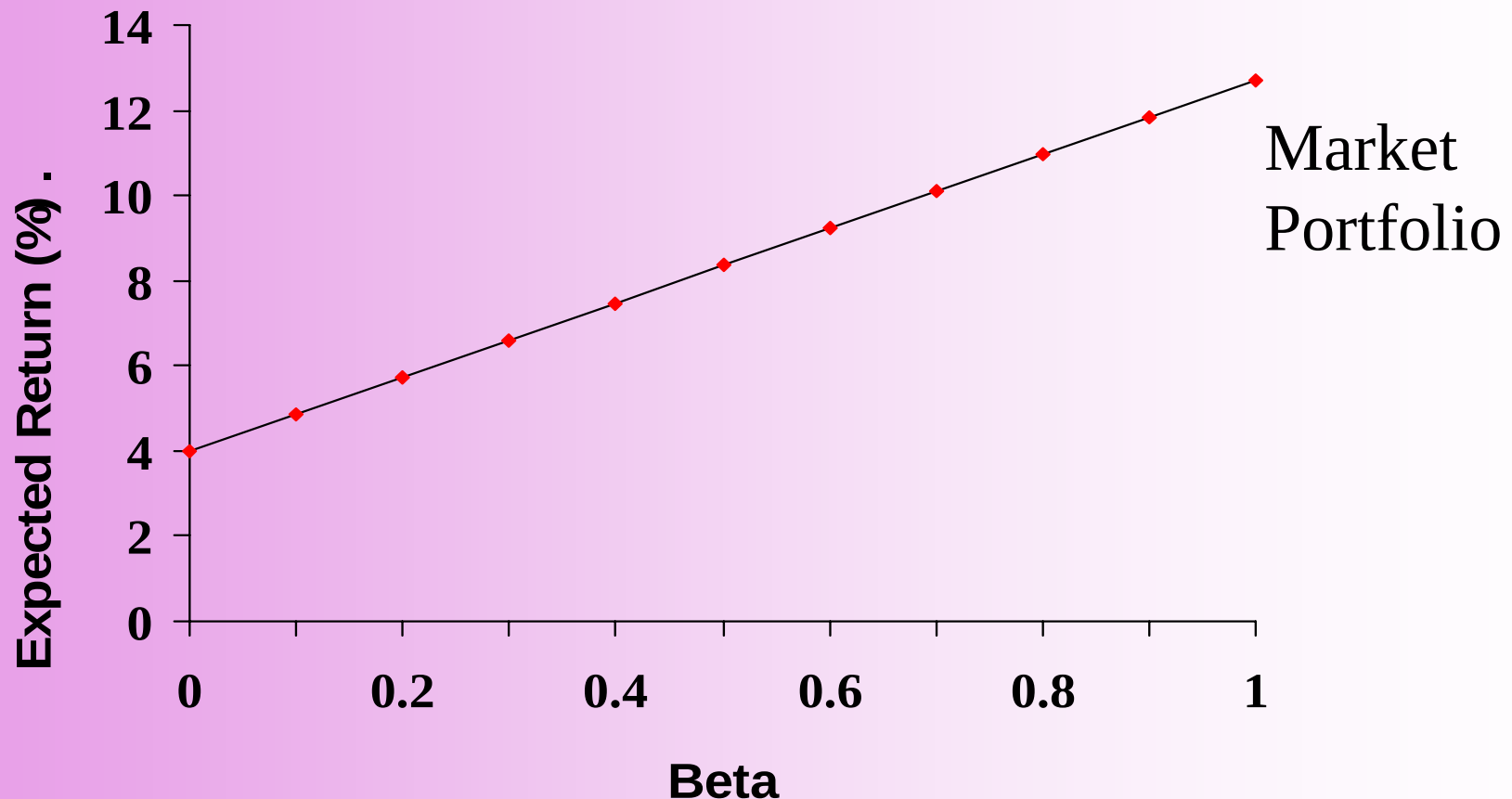


Risk and Return



Measuring Market Risk

Market Risk Premium - The difference between market return and return on risk-free Treasury bills



Measuring Market Risk

CAPM - Theory of the relationship between risk and return which states that the expected risk premium on any security equals its beta times the expected market risk premium.

$$\text{Expected market risk premium} = E[r_m] - r_f$$

$$\text{Risk premium on any asset} = r - r_f$$

$$\text{Expected Return of any asset} = r_f + \beta(E[r_m] - r_f)$$

Capital Asset Pricing Model (CAPM)

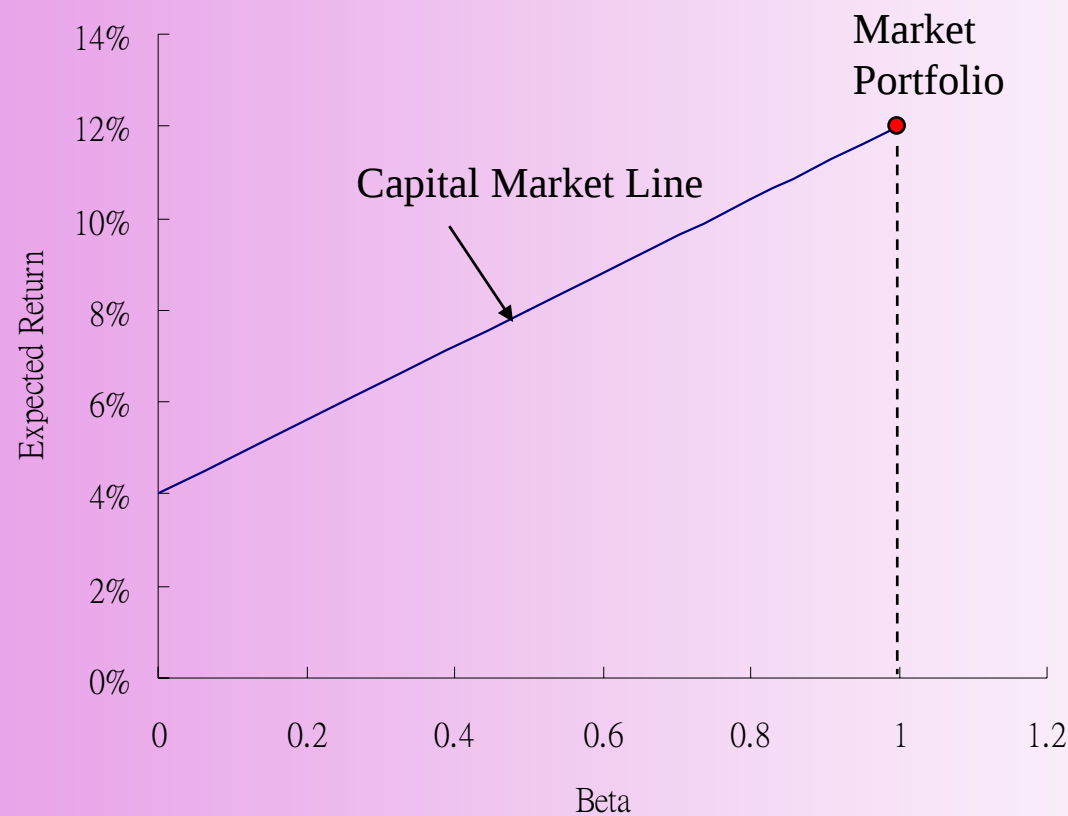
$$E[r] = r_f + \beta (E[r_m] - r_f)$$

or $E[r] - r_f = \beta (E[r_m] - r_f)$

CAPM

Measuring Market Risk

Capital Market Line - The graphic representation of the CAPM.



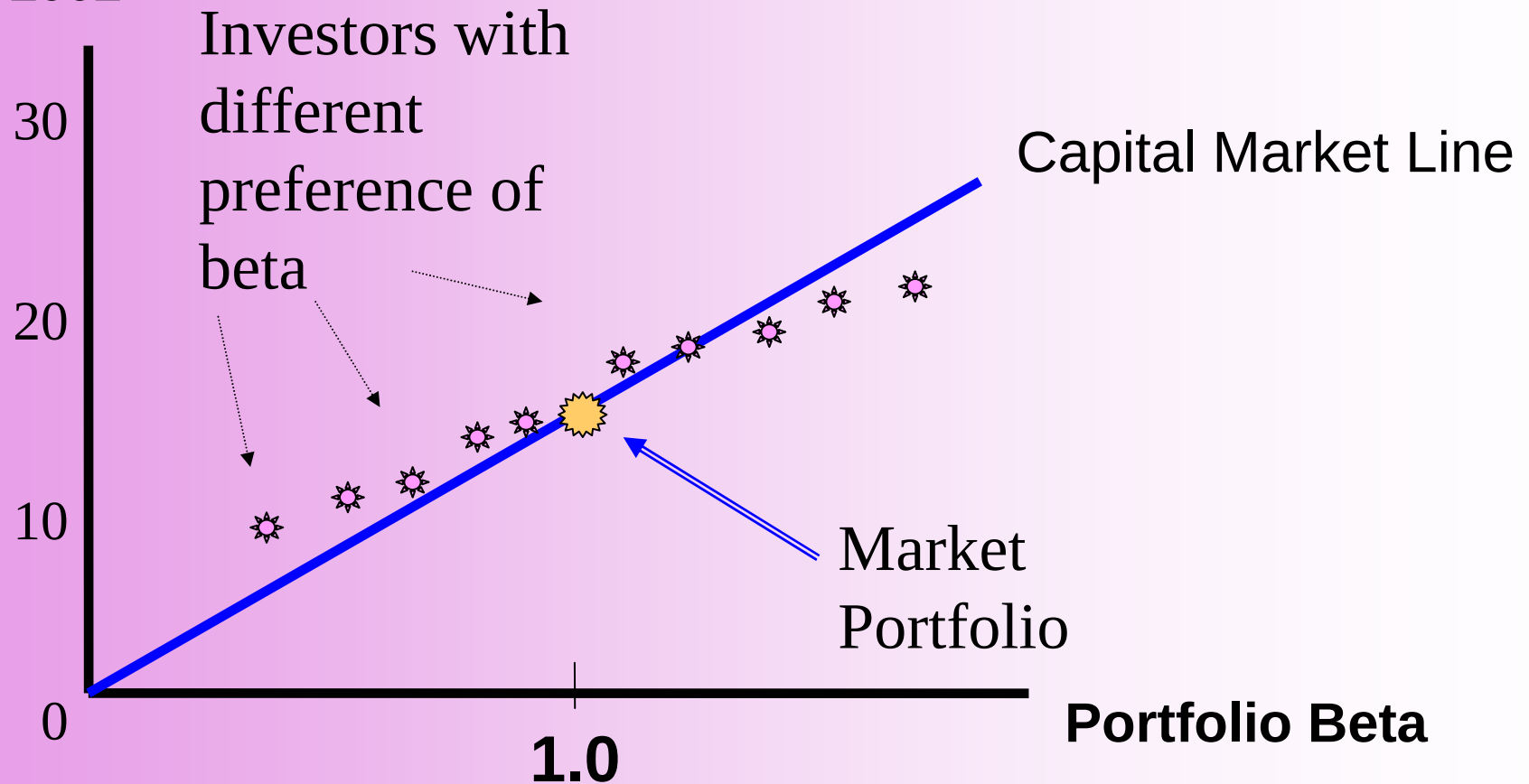
How well does the CAPM work?

- ➡ The CAPM assumes that the stock market is dominated by well-diversified investors who are concerned only with market risk
 - ➔ That makes sense in a stock market where trading is dominated by large institutions and almost every risk can be diversify at very low cost
- ➡ Divide all kinds of stocks into groups according to different levels of beta (see the next slide)

Testing the CAPM

Beta vs. Average Risk Premium

Avg Risk Premium
1931-2002



★ 高beta與低beta之報酬率的差，並不如CAPM預測的那麼大

How well does the CAPM work?

- ➔ Fama and French's model shows that high book-to-market ratio and small firms can earn more than that CAPM predicts

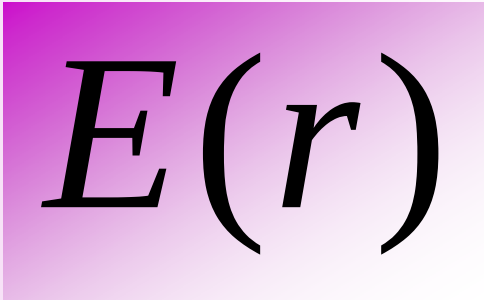
Size and Book-to-Market



How well does the CAPM work?

⇒ Using the CAPM to estimate expected returns

Stock	$E[r]$
Amazon	20.4
DellComputer	14.5
Ford	12.4
GE	9.8
McDonald's	9.3
Boeing	8.3
Wal-Mart	6.6
Pfizer	6.2
ExxonMobil	5.9
H.J. Heinz	5.1


$$E(r)$$

Capital Budgeting & Project Risk

- ➡ The company's cost of capital is the expected rate of return demanded by investors of the company, determined by the average risk of the company's securities
- ➡ The project's cost of capital depends on the use to which the capital is being put. Therefore, it depends on the risk of the project and not the risk of the company.

Capital Budgeting & Project Risk

Example - Based on the CAPM, ABC Company has a cost of capital of 17%. $(4 + 1.3(10))$. A breakdown of the company's investment projects is listed below. When evaluating a new dog food production investment, which cost of capital should be used?

1/3 Nuclear Parts Mfr.. $\beta = 2.0$

1/3 Computer Hard Drive Mfr. $\beta = 1.3$

1/3 Dog Food Production $\beta = 0.6$

AVG. β of assets = 1.3

Capital Budgeting & Project Risk

Example - Based on the CAPM, ABC Company has a cost of capital of 17%. $(4 + 1.3(10))$. A breakdown of the company's investment projects is listed below. When evaluating a new dog food production investment, which cost of capital should be used?

$$R = 4 + 0.6 (14 - 4) = 10\%$$

10% reflects the opportunity cost of capital on an investment given the unique risk of the project.

Capital Budgeting & Project Risk

➡ Determinants of Project Risk

- ➔ High fixed costs → high operating leverage → high beta
- ➔ High standard deviation of earnings does not mean to be with a high beta (because much of this variability is diversifiable risk)

➡ Don't Add Fudge Factors to Discount Rates

- ➔ Bad outcomes are reflected by the decrease of the expected cash flow
- ➔ High discount rates reflect uncertainty (market risk of the project), not the bad outcome