Corporate Finance

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- Overview equity returns
- Valuation of Equity Securities
- Estimating the Intrinsic Value
- Risk and Return: Technicalities to start from
- The Capital Asset Pricing Model (CAPM)
- The Hypothesized Relationship between Risk and Return

Contents

Asset classes and subcategories

Equities	Fixed Income	Cash	Alternative Assets
UK Equities - Large capitalisation - Mid capitalisation - Small capitalisation - Micro capitalisation - Growth - Value - Blend (Value and Growth) - Preference shares - Options and futures **Other Developed Markets** - North America - Europe - Japan - Options and futures **Emerging Markets** - Africa - Asia ex Japan - Emerging Europe - Latin America - Middle East - Options and futures	**UK Fixed Income** - UK Treasury bonds - Municipal - Corporate - Mortgage-backed - Asset-backed - Options and futures **High Yield** **Convertible Securities** **Other Developed Markets** - North America - Europe - Japan - Options and futures - Interest rate swaps **Emerging Markets** - Africa - Asia ex Japan - Emerging Europe - Latin America - Middle East - Options and futures	**Cash** - Physical holdings - Bank balance - UK Treasury bills - Municipal notes - Commercial papers - Certificates of deposit - Repurchase agreement - Banker acceptances - Non UK instruments	**Commodities** - Commodity trading advisors (CTAs) - Physicals: Agricultural, metal and oil - Options and futures **Hedge Funds** - Event driven - Relative value - Market neutral - Long - short - Global macro **Private Equity** - Leveraged Buyouts - Venture Capital - Non UK **Real Estate** - Residential - Commercial - REITs (Real Estate Investment Trusts) **Art**

Valuation

At different levels business decisions involves valuation

Capital Budgeting: involves consideration of how a particular project will affect firm value.

Strategic planning: focuses on how value is influenced by larger sets of actions.

Security analysts: conduct valuation to support their buy/sell decisions, and potential acquirers.

Basics in Valuation Approaches

- perception that markets are inefficient and make mistakes in assessing value

- an assumption about how and when these inefficiencies will get corrected

In an efficient market, the market price is the best estimate of value.

The purpose of any valuation model is then the justification of this value.

Valuation objective is to search for “true” value

Valuations are biased. The question is how much and in which direction.

The direction and magnitude of the bias is *directly proportional* to who pays you and how much you are paid.

Valuation Approaches

Discounted Cash Flow: value of any asset is estimated by computing the PV of the expected cash flows on that asset, discounted back at a rate that reflects the riskiness of the cash flows (measure of the intrinsic value of an asset).

Relative Valuation: The value of any asset can be estimated by looking how similar assets are priced in the market place.

Academic Studies

Mainly focus on the comparison of two model approaches:

- Discounted Dividends
- Discounted Cash Flows

Ratios or multiple based models are discussed in isolation or in addition of the three previous models.

Main valuation models:

Discounted Dividends: This approach expresses the value of firm's equity as the present value of forecasted future dividends.

Discounted Cash Flow (DCF): involves detailed production of multiple year forecasts of cash flows. Cash Flows are then discounted at the firm's estimated cost of capital to arrive at an estimated present value.

*Discounted Abnormal Earnings: Value of firm's equity is expressed as the sum of its book value and the present value of the forecasted abnormal earnings.

*Discounted abnormal earnings growth: Value of the firm's equity as the sum of its capitalized next-period earnings forecast and the present value of forecasted abnormal earnings growth beyond the next period.

*Real Options: Contingent Claim (Option) Valuation

Valuation based on price multiples: Current measure of performance or single forecast of performance is converted into a value by applying an appropriate price multiple derived from the value of comparable firms.

Example: firm value can be estimated by applying a price-to-earnings ratio to a forecast of the firm's earnings for the coming year. Other commonly used multiples include price-to-book ratios and price-to-sales ratios.

Discounted Cashflow Valuation

$$\text{Value} = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}$$

Where

- CF_t is the cash flow in period t,
- *r* is the discount rate appropriate given the riskiness of the cash flow, and
- t is the life of the asset.

For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.

Assets that generate cash flows early in their life will be worth more than assets that generate cash flows later; the later may however have greater growth and higher cash flows to compensate.

Characteristics of Ordinary Shares

Ordinary shares typically provide investors with an infinite stream of uncertain cash flows or dividends - D_1, D_2, ..., D_n,... The price of ordinary shares today is the present value of all future expected dividends discounted at the "appropriate" required rate of return (or discount rate)

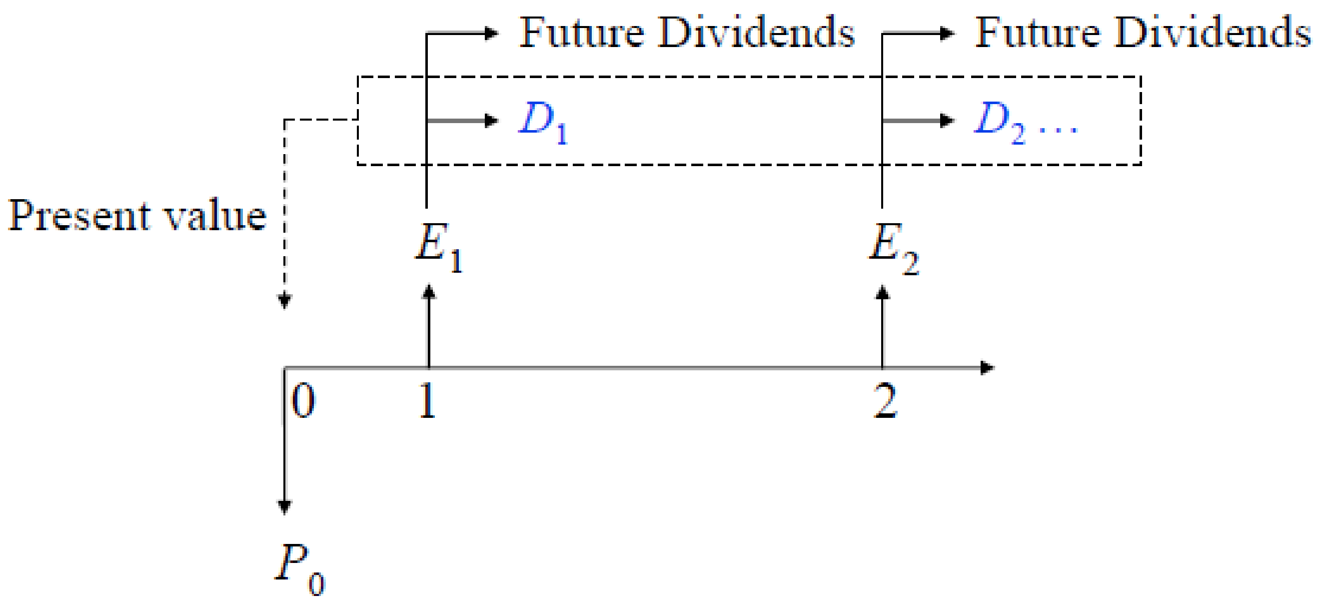
$$P_0 = \sum_{t=1}^{N} \frac{CF_t}{(1+k_e)^t}$$

where k_e is the rate of return required by investors for the time value and risk associated with the security's cash flows (CFt)

What cash flows are relevant?

Characteristics of Ordinary Shares

Need to consider dividends, which are paid from earnings



Pricing Ordinary Shares

In a one period framework, the stock price is equal to the sum of the next period's dividend and the expected price discounted at the required return

$$P_0 = \frac{D_1 + P_1}{1 + k_e} \quad \text{and} \quad P_1 = \frac{D_2 + P_2}{1 + k_e} \quad \text{and} \quad P_t = \frac{D_{t+1} + P_{t+1}}{1 + k_e}$$

Over any period, the expected rate of return (*ke) is*

$$k_e = \frac{D_{t+1} + P_{t+1}}{P_t} - 1 = \frac{D_{t+1}}{P_t} + \frac{P_{t+1} - P_t}{P_t}$$

$$k_e = \text{Dividend yield} + \text{Percent price change}$$

Pricing Ordinary Shares

Example: The price and dividend per share for OzCo Ltd next period are expected to be \$5.00 and \$0.50, respectively. If the expected return on these shares is 10% p.a. what is OzCo's current stock price? If the current price changes to \$4.80 what has happened to the expected return on these shares? Why?

Given: P_{t+1} = \$5.00, D_{t+1} = \$0.50 and k_e = 10%

$$P_t = \frac{0.50 + 5.00}{1 + 0.10} = \$5.00$$

If the current price changes to \$4.80, the expected return rises to

$$k_e = \frac{0.50 + 5.00}{4.80} - 1 = 14.6\%$$

Note that prices and expected returns are inversely related

Pricing Ordinary Shares

The stock price over periods 0, 1 and 2 can be written as

$$P_0 = \frac{D_1 + P_1}{1 + k_e} \quad \text{and} \quad P_1 = \frac{D_2 + P_2}{1 + k_e} \quad \text{and} \quad P_2 = \frac{D_3 + P_3}{1 + k_e}$$

Substituting P_2 and P_1 recursively, we get P_0 as

$$P_0 = \frac{D_1}{1 + k_e} + \frac{D_2}{(1 + k_e)^2} + \frac{D_3 + P_3}{(1 + k_e)^3}$$

- The current dividend (D_0) is not relevant to our estimate of the current price - all prices estimated are ex-dividend prices
- Ex-dividend prices are prices after the current period's dividend has been paid

Pricing Ordinary Shares

Extending the above process to H periods, we get

$$P_0 = \frac{D_1}{1+k_e} + \frac{D_2}{(1+k_e)^2} + \frac{D_3}{(1+k_e)^3} + \ldots + \frac{D_H + P_H}{(1+k_e)^H}$$

$$P_0 = \sum_{t=1}^{H} \frac{D_t}{(1+k_e)^t} + \frac{P_H}{(1+k_e)^H}$$

$$As\ H \to \infty, PV(P_H) \to 0$$

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k_e)^t}$$

Market analysts often make simplifying assumptions about future expected dividends

Constant Dividend Growth Model

A constant growth rate in dividends implies

$$D_2 = D_1(1+g),\ D_3 = D_1(1+g)^2,\ \ldots,\ D_t = D_1(1+g)^{t-1}$$

Substituting the above dividends in the expression for P_0 we get

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k_e)^t} = \sum_{t=1}^{\infty} \frac{D_1(1+g)^{t-1}}{(1+k_e)^t}$$

$$As\ t \to \infty,\ \sum_{t=1}^{\infty} \frac{(1+g)^{t-1}}{(1+k_e)^t} \to \frac{1}{k_e - g}$$

The above expression simplifies to

$$P_0 = \frac{D_1}{k_e - g} \quad \text{where } k_e > g \qquad \text{or} \qquad P_t = \frac{D_{t+1}}{k_e - g}$$

Constant Dividend Growth Model

Application 1: Assume that year 0 is the end of 2004. Telstra Ltd is expected to pay annual dividends of $0.26 in 2005 (year 1). Assume that this dividend grows at an annual rate of 5% in the foreseeable future and investors require a return of 10% p.a.

a) Estimate Telstra's stock price today
b) What is Telstra's price expected to be at the end of 2005?
c) Based on Telstra's current price of $4.75, what is the constant dividend growth rate implied?
d) How sensitive is the price estimate to different assumptions regarding the growth in dividends over time?
e) How sensitive is the price estimate to different assumptions regarding the required rate of return?

Constant Dividend Growth Model

Given: D_1 = 0.26, g = 0.05 and ke = 0.10

a) P_0 = 0.26/(0.10 - 0.05) = \$5.20
b) P_1 = D2/(ke - g) = 0.26(1.05)/(0.10 - 0.05) = \$5.46 (a 5% rise)
c) ke = D_1 /P_0 + g or g = ke - D_1 /P_0
g = 0.10 - 0.26/4.75 = 0.0453 or 4.5%
d) Sensitivity of Telstra's price to changes in expectations of g

g = 3%:P_0 = 0.26/(0.10 - 0.03) = \$3.71 (-28.7%)
g = 4%:P_0 = 0.26/(0.10 - 0.04) = \$4.33 (-16.7%)
g = 5%:P_0 = 0.26/(0.10 - 0.05) = \$5.20
g = 6%:P_0 = 0.26/(0.10 - 0.06) = \$6.50 (+25.0%)
g = 7%:P_0 = 0.26/(0.10 - 0.07) = \$8.67 (+66.7%)

Constant Dividend Growth Model

Sensitivity of Telstra's price to changes in ke

ke = 8%: P_0 = 0.26/(0.08 - 0.05) = \$8.67 (+66.7%)
ke = 9%: P_0 = 0.26/(0.09 - 0.05) = \$6.50 (+25.0%)
ke = 10%: P_0 = 0.26/(0.10 - 0.05) = \$5.20
ke = 11%: P_0 = 0.26/(0.11 - 0.05) = \$4.33 (-16.7%)
ke = 12%: P0 = 0.26/(0.12 - 0.05) = \$3.71 (-28.7%)

- Price estimates are very sensitive to assumptions regarding future dividends, growth in dividends and required rate of return

- It is often more realistic to assume a variable growth rate in dividends with higher initial growth in dividends followed by subsequent lower (or zero) growth in dividends

Variable Dividend Growth Model

Application 2: In the previous application, assume that Telstra's current dividend of $0.25 grows at 10% for 3 years and then stabilizes at 5% thereafter. What price should Telstra shares sell for today if the required rate of return remains at 10%?

Three step procedure to estimate P_0

Step 1: Compute the dividends up to the point where g becomes constant (over years 1 to 4 in this case)

Step 2: Compute the price at the end of the year after which dividends grow at a constant rate (year 3 in this case)

Step 3: Add the present value of dividends from Step 1 to the present value of the price from Step 2 to get P_0

Variable Dividend Growth Model

Given: D_0 = \$0.25, g_1 = 10% over years 1 - 3,
g_2 = 5% from year 4 onwards, ke = 10%

Step 1: Obtain dividends up to where g becomes constant

$D_1 = 0.2500(1.10) = \$0.2750$

$D_2 = 0.2750(1.10) = \$0.3025$

$D_3 = 0.3025(1.10) = \$0.3328$

$D_4 = 0.3328(1.05) = \$0.3494$

Step 2: Obtain P_n (after which dividend growth is constant)

$P_3 = D_4 /(ke - g_2) = 0.3494/(0.10 - 0.05) = \$6.988$

Step 3: Add the present values of dividends and P_n to get P_0

$P_0 = D_1/(1 + ke) + D_2 /(1 + ke)^2 + (D_3 + P_3)/(1 + ke)^3$

$P_0 = 0.2750/1.1 + 0.3025/1.1^2 + (0.3328 + 6.988)/1.1^3 = \$6.00$

Equity versus Firm Valuation

- Value just the equity stake in the business.

- Value the entire business, which includes, besides equity, the other claimholders in the firm

Equity Valuation

The value of equity is obtained by:

Discounting expected *cashflows to equity* (the residual cashflows after meeting all expenses, tax obligations and interest and principal payments) at the cost of equity (required return to shareholders).

$$\text{Value of Equity} = \sum_{t=1}^{n} \frac{\text{CF to Equity}_t}{(1+k_e)^t}$$

$\text{CF to Equity}_t =$ Expected Cashflow to Equity in period t

$k_e =$ Cost of Equity

Note: The dividend discount model is a specialized case of equity valuation

Firm Valuation

The value of the firm is obtained by:

Discounting expected *cashflows to the firm* (the residual cashflows after meeting all operating expenses and taxes, but prior to debt payments) *at the WACC* (cost of the different components of financing used by the firm, weighted by their market value proportions)

$$\text{Value of Firm} = \sum_{t=1}^{n} \frac{\text{CF to Firm}_t}{(1+\text{wacc})^t}$$

Adjusted Present Value approach:

Firm Value = Unlevered Firm Value + PV of tax benefits of debt - Expected Bankruptcy Cost

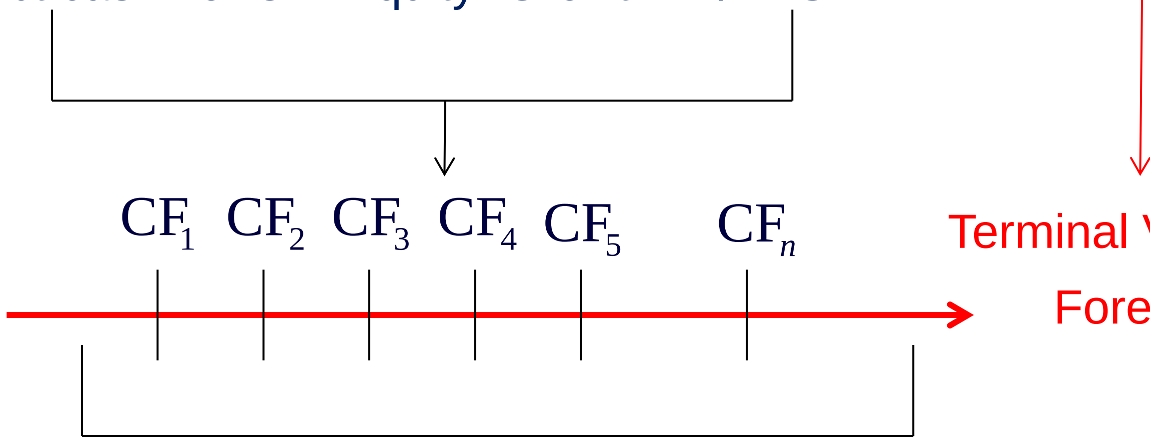
Generic DCF Valuation Model

Firm is a stable growth
Grows at constant rate
forever

Cash Flows
Firm: Pre-debt cash flows
Equity: After-debt cash flows

Expected Growth
Firm: Growth in Operating Earnings
Equity: Growth NI/EPS

Value
Firm: Value of Firm
Equity: Value of Equity



Terminal Value

Forever

Length of period of High Growth

Discount Rate
Firm: Cost of Capital
Equity: Cost of Equity

Estimating the Intrinsic Value

Most investment valuation involves:

Estimating the amount and timing of the cash flows

Interest, dividends, and capital gains

Estimating the growth rate of returns

- common stock / Real estate (Can grow over time)
- Preferred Stock / Bonds (fixed)

Applying an appropriate discount rate to the cash flows to estimate the investment's intrinsic value

The required return for the risk assumed Amount & timing of cash flow

Comparing the intrinsic value to the market price

If estimated intrinsic value > market price, then BUY!

Discounted Cash Flow Models

Preferred Stock

$$P_{pdf} = \frac{DIV}{r_P}$$

- Fixed/Perpetual Income-never matures
- Market Rate

Common Stock

Projected (not fixed)

$$P_{cs} = \frac{DIV_1}{(1+R_{CE})} + \frac{DIV_2}{(1+R_{CE})^2} + \ldots + \frac{DIVn + P_{CS_n}}{(1+RCE)^n}$$

$$\frac{DIV_n + 1}{r - g}$$

Constant (Gordon) Growth DDM

- g ≤ g economy

$$P_{CS} = \frac{DIV_1}{R_{CE} - g_{DIV}}$$

DIV_1: $DIV_0 \times (1+g)$

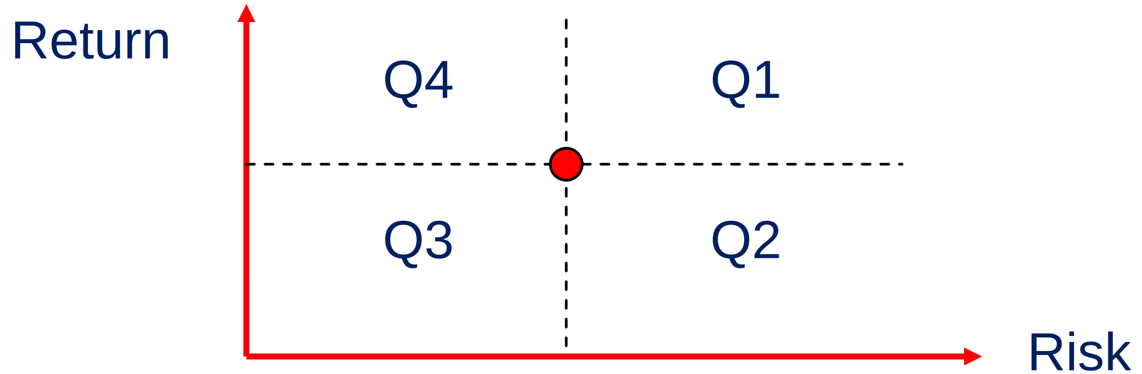
$EPS_1 \times \text{Payout Rate}$

g_{DIV}: $ROE \times \text{Retention Rate}$

Technicalities to start from

Facts about Risk and Return

- Concepts defined from the perspective of investor not issuer.
- Assessment of risk and return represent the central issue for investment management
- Investors are risk averse (like returns and dislike risk)



Risk and Risk Premium

Every investment involves some degree of uncertainty

- future selling price is unknown, future dividends are unknown, unknown future cash flows, …
- might have to sell assets due to emergency
- reinvestment rate might change (fall)
- increase in inflation changes the purchasing power of money / investment receipts

Expected holding period return (t = 0) is not the same as actual holding period return (t = 1)

$$E_t H_{t+1} = H_{t+1} + e_{t+1}$$

Scenario Analysis and Probability Distribution

To quantify risk, address two questions:

- What Holding period return is possible ?
- How likely is it ?

Scenario Analysis

- Assess different economic scenarios (outcomes)

Probability Distribution

- Assign probabilities to possible outcomes

Example : Scenario Analysis

Measurement of Equity Returns			
State of the Economy	Probability (prob)	Expected Return (ER)	Prob.×ER
Bad times	¼	-10%	-2.5%
Normal	½	10%	5%
Good times	¼	20%	5%
Expected Return = 7.5%			

Dispersion / Variability

Analyzing the data from the previous table, what surprises await us?

Definition of "surprise":

Surprise = Return - Expected Return

Measures of dispersion of actual return from expected return: variance (defined as average square surprises) or standard deviation (square root of variance).

The reason why we use expected (mean) return and standard deviation as return and risk measures in investment decision making process is because we assume that past asset returns follow normal distribution.

Converting Prices into Rate of Returns

Financial data is usually reported as prices (Bloomberg, Datastream, etc)

For our statistical analysis and to be able to compare different investments we have to convert prices into returns

Example :

Suppose two shares with the following share price

- ABC share price (P = £1.10)
- XYZ share price (P = £4.35)
- Difficult to compare as they are measured in different ‘units’ (different base).

Converting Prices → Returns

- Arithmetic Rate of Return

  $R_t = (P_t + D_{t-1} - P_{t-1}) / P_{t-1}$

- Geometric Rate of Return (continuously compounded return).

  $R_t = \ln [(P_t + D_{t-1})/P_{t-1}]$

Converting Prices into Returns - Example

Suppose that stock ABC had the following end-of-month prices:

245p on 31st August 2011

256p on 30th September 2011

Anticipated dividend for 2009 is 10p, therefore on a monthly basis it will be 10p/12=0.83333p

The arithmetic monthly rate of return of this stock is:

R_t = (256 + 0.833 – 245)/245 = 0.048 = 4.8%

The geometric monthly rate of return of this stock is:

R_t = ln [(256 + 0.833)/ 245] =0.047 = 4.7%

Advantages of Continuously Compounded Rate of Return

Geometric rate of return is also known as continuously compounded return.

Differences of calculating the arithmetic or continuously compounded rate of return are small, especially for daily, weekly or even monthly data

If the formula for Geometric return is solved for P, continuously compounded rate of return will never give negative prices.

The Capital Asset Pricing Model

Asset Pricing: how assets are priced?

The equilibrium concept

Portfolio Theory

- ANY individual investor's optimal selection of portfolio (*partial* equilibrium)

CAPM

- Equilibrium of ALL individual investors (*general* equilibrium)

Risky asset i: Its price is such that

$$E(r) = R_F + Risk\ Premium\ specific\ to\ asset\ i$$

$$R_F + (market\ price\ of\ risk) \times (quantity\ of\ risk\ of\ asset\ i)$$

The Capital Asset Pricing Model

The *amount of risk* is measured by the covariance of the asset with the market portfolio

The *market price of risk* is the return above the risk-free rate that investors earn for holding the (risky) market portfolio

The *risk premium* can be thought of as a “price” times “quantity” relationship

Higher the market price of risk and/or higher the amount of risk, greater the risk premium

The Capital Asset Pricing Model: What is it?

Hypothesizes that investors require higher rates of return for greater levels of relevant risk

There are no prices on the model, instead it hypothesizes the relationship between risk and return for individual securities.

It is often used, however, to price securities and investments

Assumptions

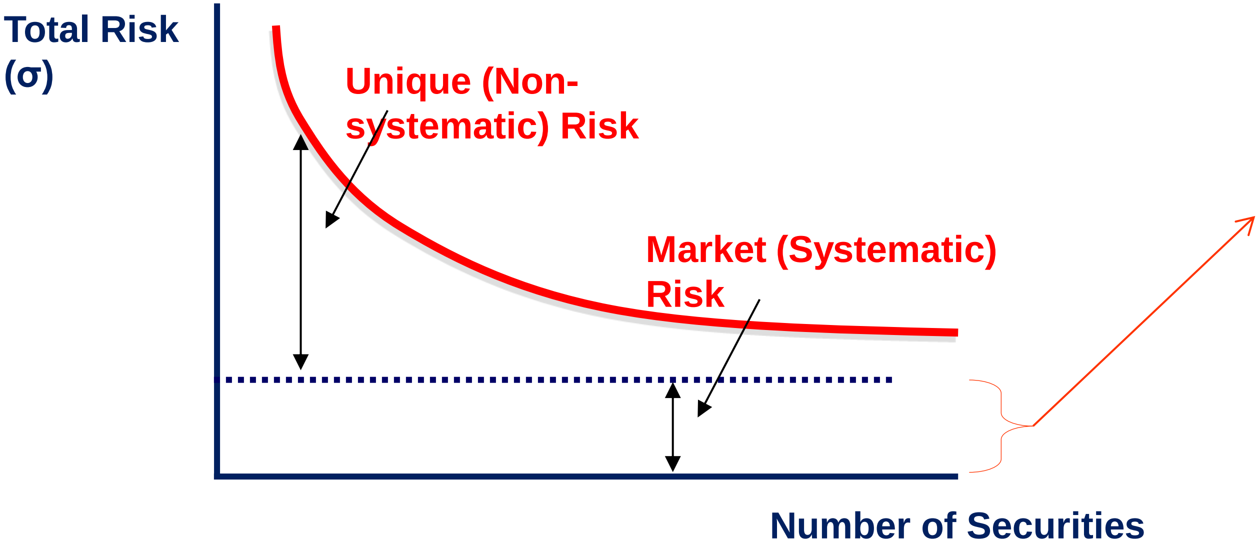
- one period investment horizon
- rational, risk-averse investors
- unlimited borrowing and lending is allowed at a risk free rate that is the same for all investors
- there are no taxes
- there are no transaction costs and inflation
- all assets are infinitely divisible
- free flow and instant availability of information
- there are many investors on the market
- all assets are marketable
- all investors have homogeneous expectations about expected returns, variances and covariances of assets

Diversifiable and Non-Diversifiable Risk

CML applies to efficient portfolios

Volatility (risk) of *individual security returns* are caused by two different factors:

- Non-diversifiable risk (system wide changes in the economy and markets that affect all securities in varying degrees)
- Diversifiable risk (company-specific factors that affect the returns of only one security)



Market or systematic risk is risk that cannot be eliminated from the portfolio by investing the portfolio into more and different securities

Relevant Risk

Previous figure demonstrates that an individual securities' volatility of return comes from two factors:

- Systematic factors
- Company-specific factors

When combined into portfolios, company-specific risk is diversified away.

Since all investors are 'diversified' then in an efficient market, no-one would be willing to pay a 'premium' for company-specific risk.

Relevant risk to diversified investors then is systematic risk.

Systematic risk is measured using the Beta Coefficient

Measuring Systematic Risk

The Beta Coefficient

What is the Beta Coefficient?

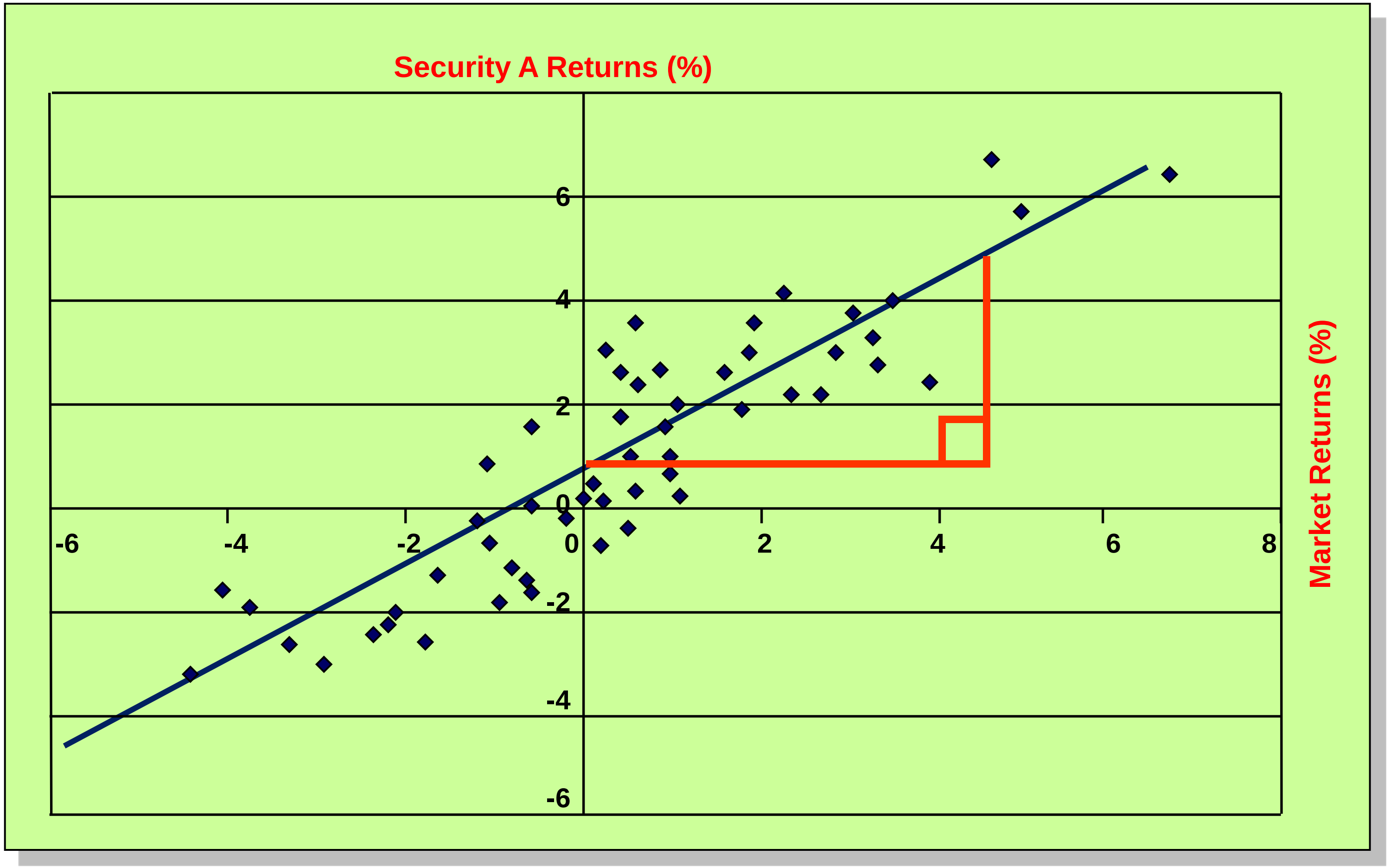
A measure of systematic (non-diversifiable) risk

As a 'coefficient' the beta is a pure number and has no units of measure.

How Can We Estimate the Value of the Beta Coefficient?

- Using a formula (and subjective forecasts)
- Use of regression (using past holding period returns)

The Characteristic Line for Security A



The plotted points are the coincident rates of return earned on the investment and the market portfolio over past periods

The Formula for the Beta Coefficient

Beta is equal to the covariance of the returns of the stock with the returns of the market, divided by the variance of the returns of the market

$$\beta_i = \frac{Cov_{i,M}}{\sigma_M^2} = \frac{\rho_{i,M}\sigma_i}{\sigma_M}$$

How is the Beta Coefficient Interpreted?

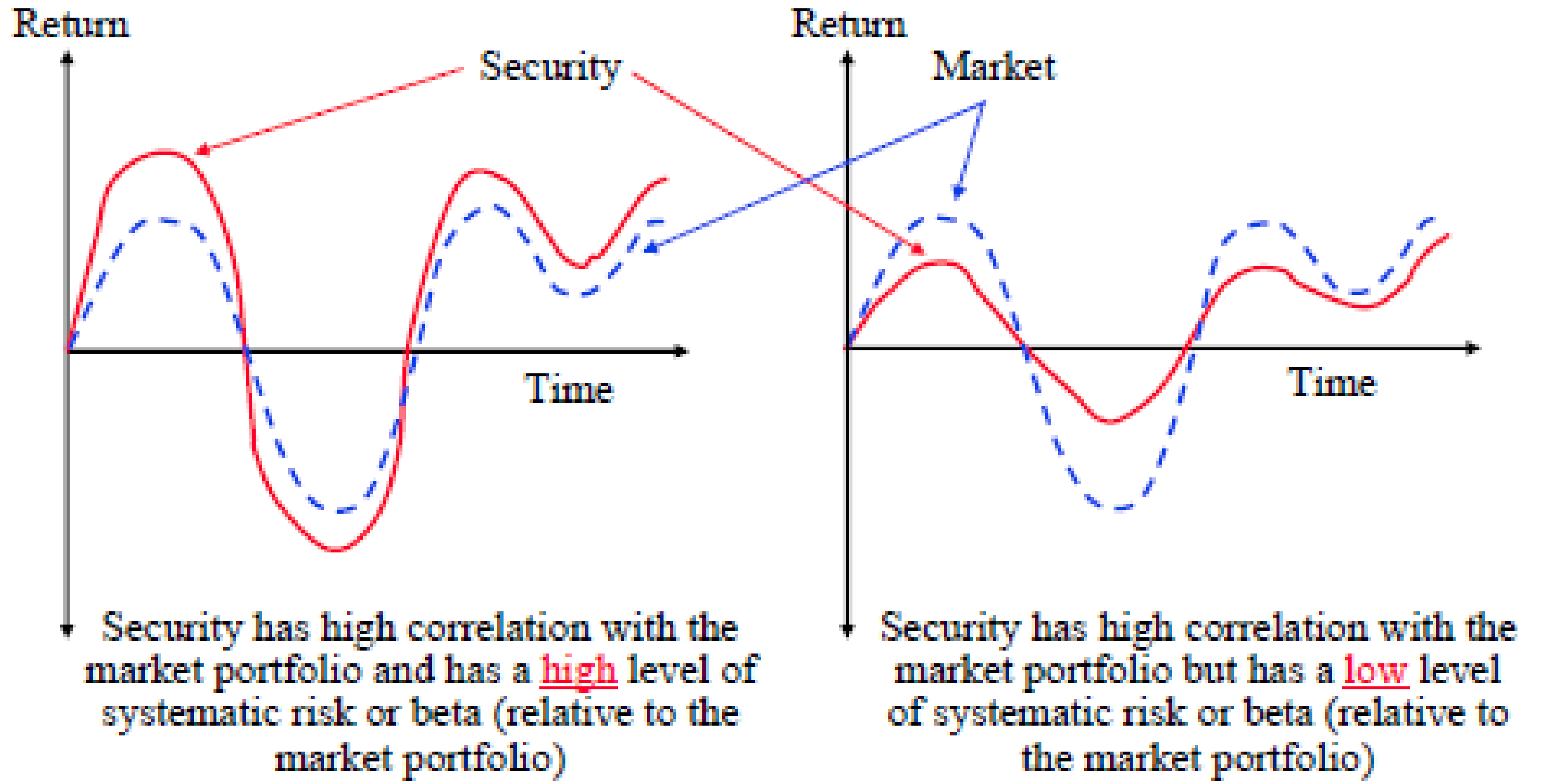
The beta of the market portfolio is ALWAYS = 1.0

The beta of a security compares the volatility of its returns to the volatility of the market returns:

$\beta_s = 1.0$	-	the security has the same volatility as the market as a whole
$\beta_s > 1.0$	-	aggressive investment with volatility of returns greater than the market
$\beta_s < 1.0$	-	defensive investment with volatility of returns less than the market
$\beta_s < 0.0$	-	an investment with returns that are negatively correlated with the returns of the market

Betas and Correlations

Beta is not the same as the correlation between a security (portfolio) and the market portfolio



The Beta of a Portfolio

The beta of a portfolio is simply the weighted average of the betas of the individual asset betas that make up the portfolio

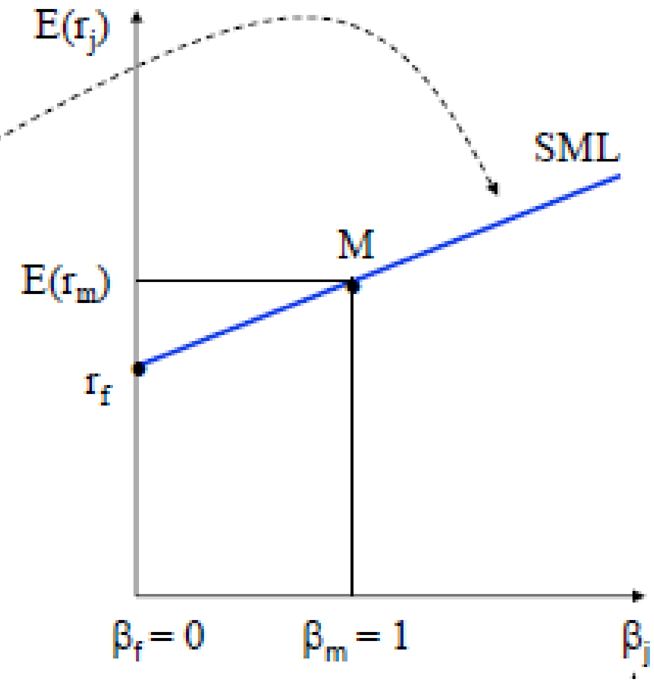
$$\beta_P = w_A \beta_A + w_B \beta_B + \cdots + w_n \beta_n$$

Weights of individual assets are found by dividing the value of the investment by the value of the total portfolio.

The Security Market Line

In equilibrium, all risky securities are priced so that their expected returns plot on the SML

$$E(R_i) = R_F + \beta_j[E(R_M) - R_F]$$



Assets with β_j less (more) than 1 earn an expected return lower (higher) than the market Portfolio

Note: The x-axis of the CML (used to "price" efficient portfolios) differs from the x-axis of the SML (used to "price" individual assets)

Relationship Between Prices and Returns

Class Exercise 1:

Oz Ltd's dividend is expected to be $1.00 per share next year and remain unchanged in the future (i.e., g = 0). The following information is given:

Oz Ltd's beta = 1.2
Riskfree rate: $R_F = 6\%$
Expected market risk premium: $[E(R_M) - R_F] = 7\%$
[
a) What price should Oz Ltd be selling for today?

b) What will happen to Oz price if, after a market crash, analysts change their estimate of Oz beta to 1.5 and no other change occurs? Explain

c) What general relationship between prices and returns is being illustrated here?

Relationship Between Prices and Returns

a) Based on the CAPM

$E(r) = 0.06 + 0.07(1.2) = 0.144$ or 14.4%

$P_0 = 1.00/0.144 = \$6.94$

b) Based on the new beta estimate of 1.5, we have

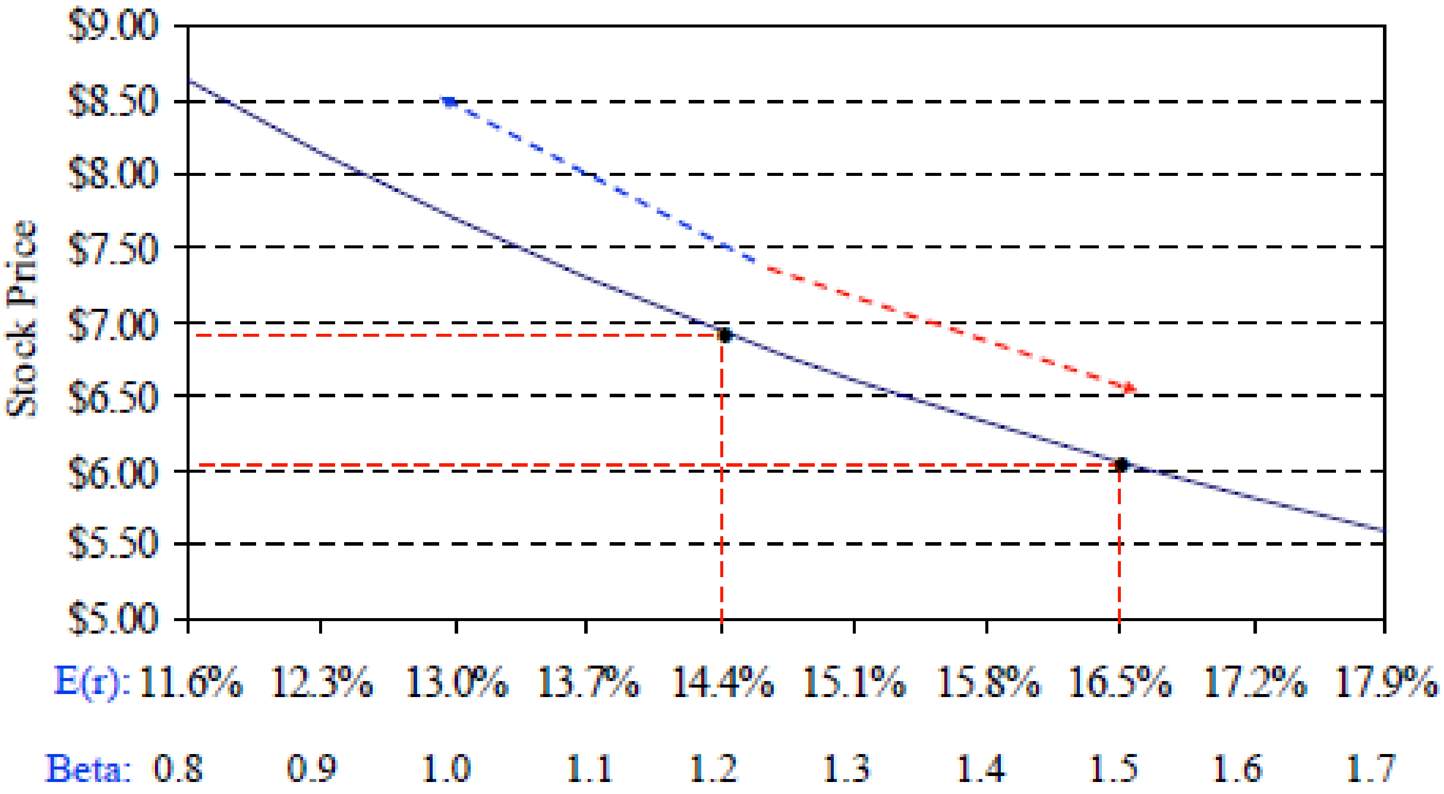
Revised $E(r) = 0.06 + 0.07(1.5) = 0.165$ or 16.5%

E(r) has increased but at $6.94 investors earn only 14.4% Investors will move funds to other similar risk securities which offer a higher expected return of 16.5%

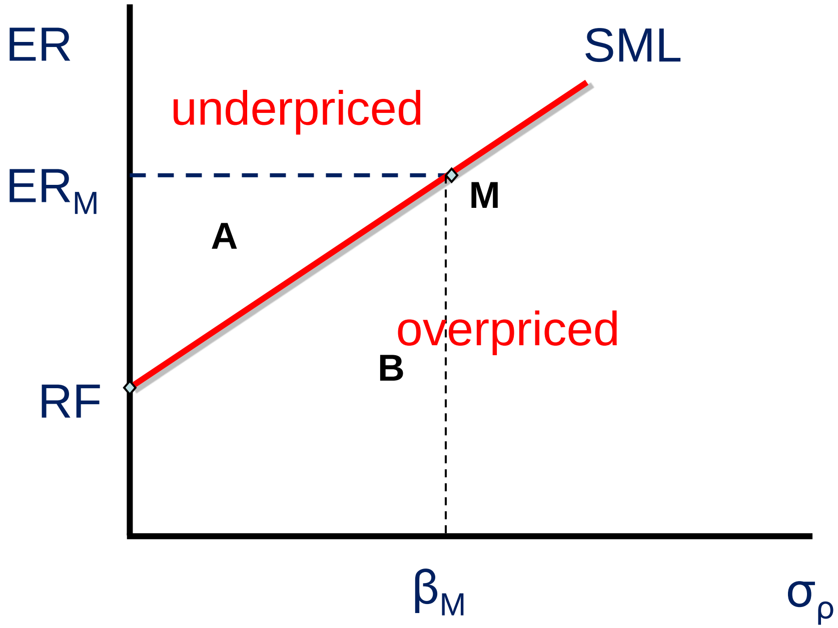
The selling pressure results in a new price

New $P_0 = 1.00/0.165 = \$6.06$

Relationship Between Prices and Returns



SML and Overvalued/Undervalued Securities



Undervalued Securities: plotted above the SML because they offer greater expected return for a given level of risk, implying that their prices are low. Investors will recognize the arbitrage opportunity and they will start buying those securities. The increase in the demand will drive prices of under-priced securities up, their returns down and the security will eventually be driven to the SML level.

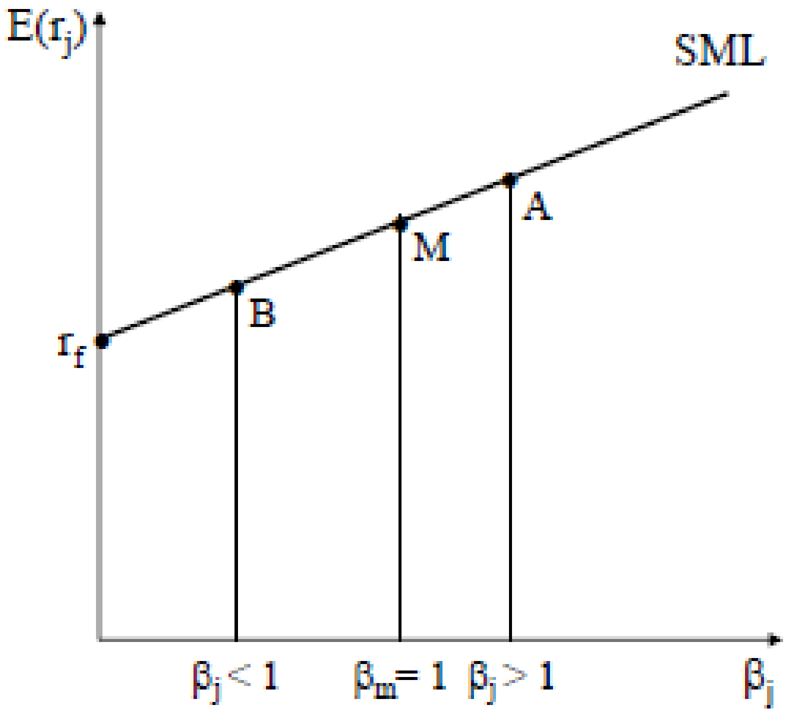
The opposite process will happen to overvalued securities.

Movements in the Security Market Line

Application: What happens to the SML in the following cases

a) There is an unexpected increase in the market risk premium

b) There is an unexpected decrease in the risk-free rate



Movements in the Security Market Line

a) An unexpected increase in the market risk premium

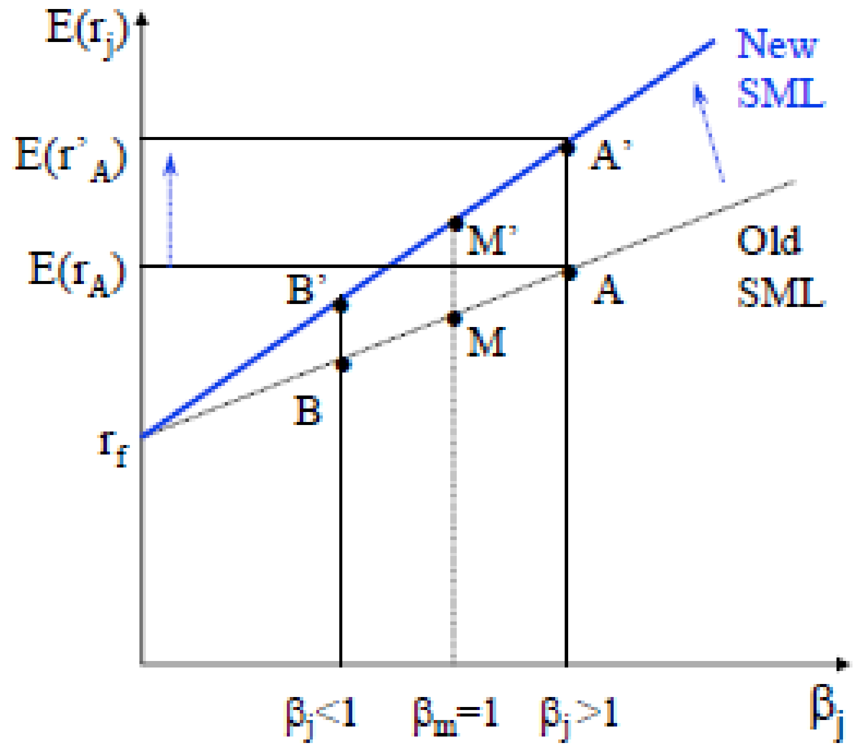
$[E(R_M) - R_F]$ *increases*

The SML is steeper (assuming R_F unchanged)

$E(R)$ of asset A increases so A's price will fall

$E(R)$ of the lower risk asset B will rise less than the $E(R)$ of the higher risk asset A

$E(R_M)$ also increases so the market will fall in value



Movements in the Security Market Line

b) An unexpected decrease in the risk-free rate

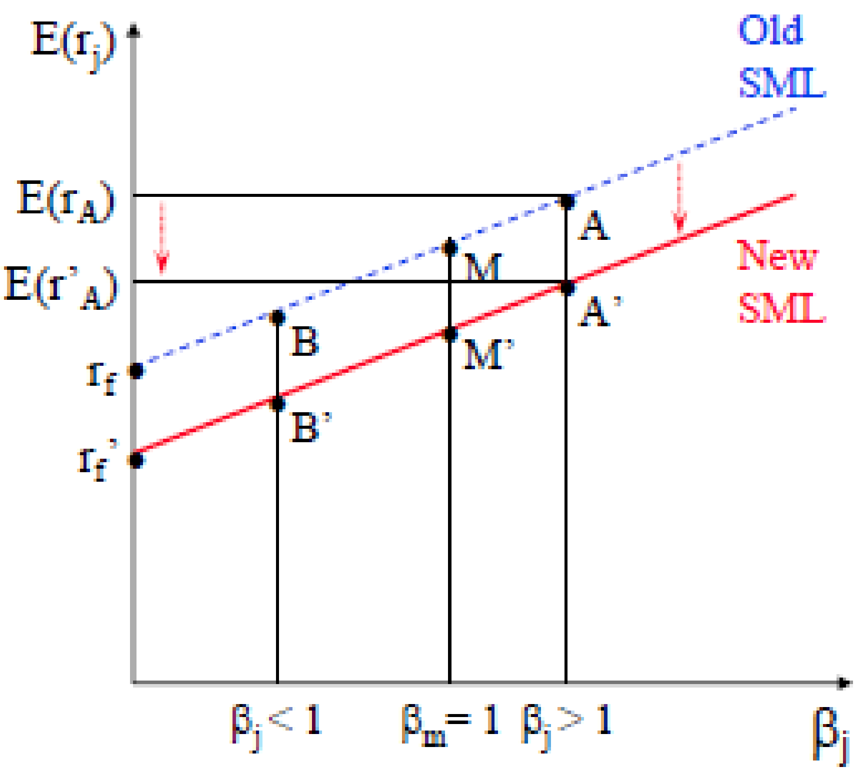
R_F *decreases*: *assume no change in the market risk premium* $[E(R_M) - R_F]$

Implies a downward, parallel shift in the SML

E_R *of Asset A decreases so the price of A will rise*

$E(R_M)$ *also falls so the market will rise in v*

$Expected\ fail\ in\ E(R_B) = Expected\ fall\ in\ E(R_A)$



CAPM and Market Anomalies

The existence of market anomalies is inconsistent with the CAPM

Some findings across time

- Returns lower on Mondays than on other days
- Returns higher in January compared to other months (especially for small firms)
- Returns higher the day before a holiday
- Returns higher at the beginning and end of the trading day

Some findings across securities (holding β constant)

- Returns higher for firms with "low" price-earnings ratios
- Returns higher for smaller firms compared to larger firms
- Returns higher for firms with higher book-to-market value of equity ratios

Putting it all Together