333-201 Business Finance

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333-201 Business Finance

Lecture 4

Valuation of Equity Securities

Objectives

- Do earnings and dividends matter?
- Examine the characteristics and pricing of ordinary shares
- Analyze the relationship between earnings, dividends, and prices
- Examine the concept of growth opportunities

Required Readings: Lectures 6 - 8

Lecture 6
PBEHP, Ch 7 (Sections 7.4 - 7.5)

Lectures 7 – 8
PBEHP, Ch 7 (sections 7.4 - 7.6.1)

Dividend Fundamentals

Relevant dates for dividend payments

Announcement Date	The day the firm announces the dividend, dividend record, and payment dates
Date of record	All persons recorded as stockholders on this date receive the declared dividend.
Ex dividend date	The first date when buying a stock does not entitle the new buyer to the declared dividend.

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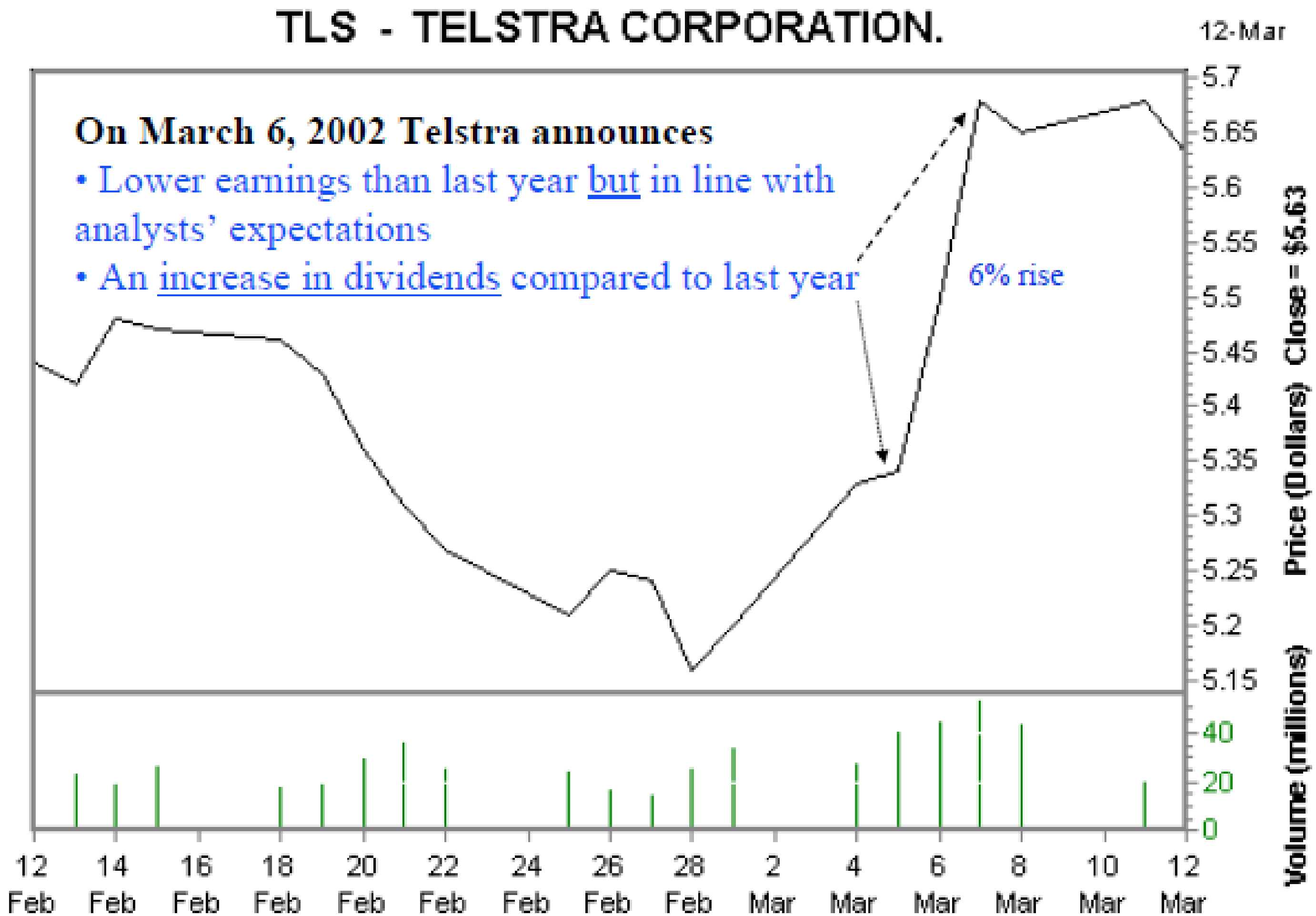
Patterns Observed In Dividend Policies Worldwide

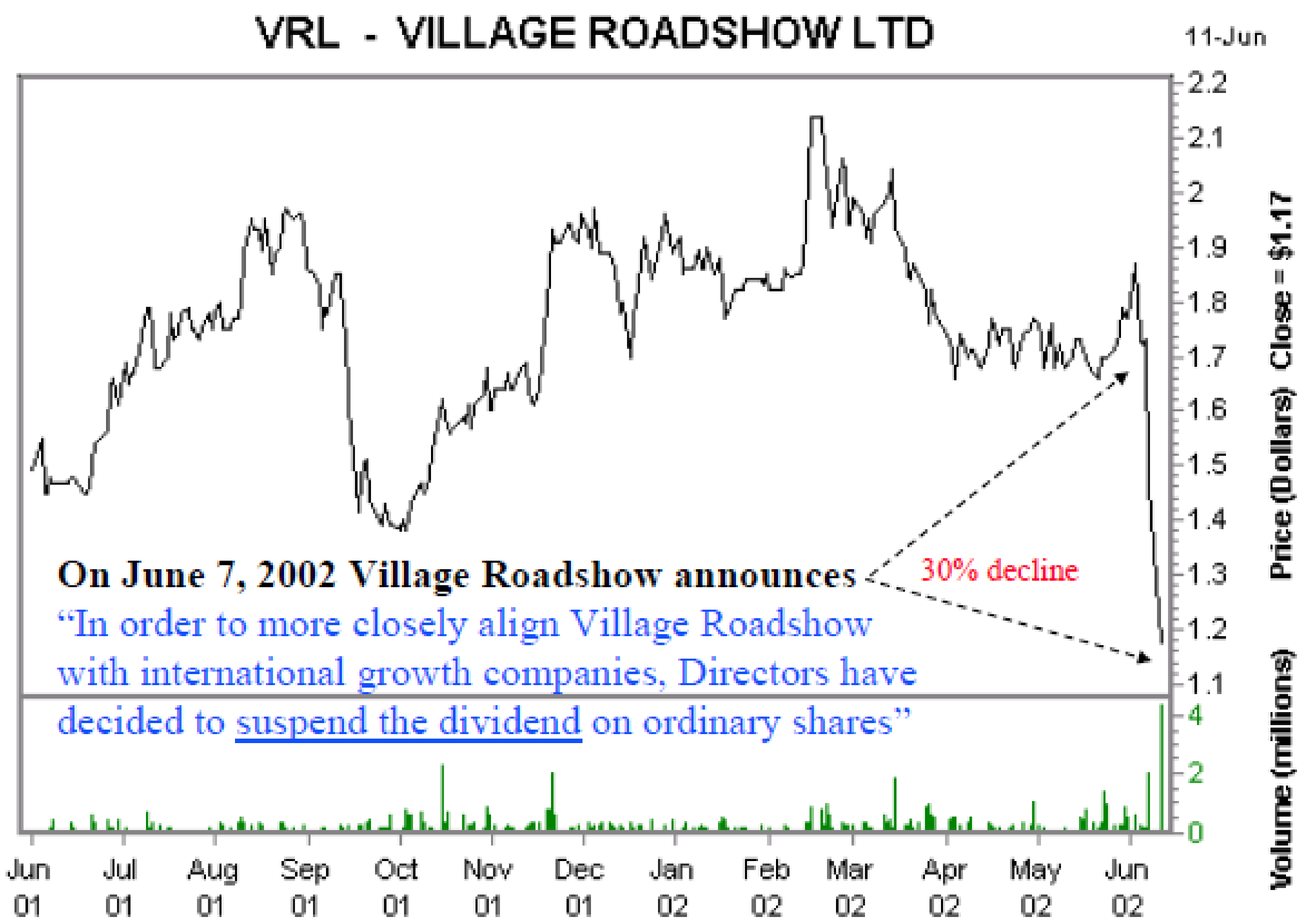
The stock market reacts positively to dividend increases and negatively to decreases or cuts.

Taxes influence dividend payouts, but the net effect is ambiguous

It is unclear how dividends affect the required return on a firm's common stock.

Do Earnings and Dividends Matter?





On June 7, 2002 Village Roadshow announces
"In order to more closely align Village Roadshow with international growth companies, Directors have decided to suspend the dividend on ordinary shares"

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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)

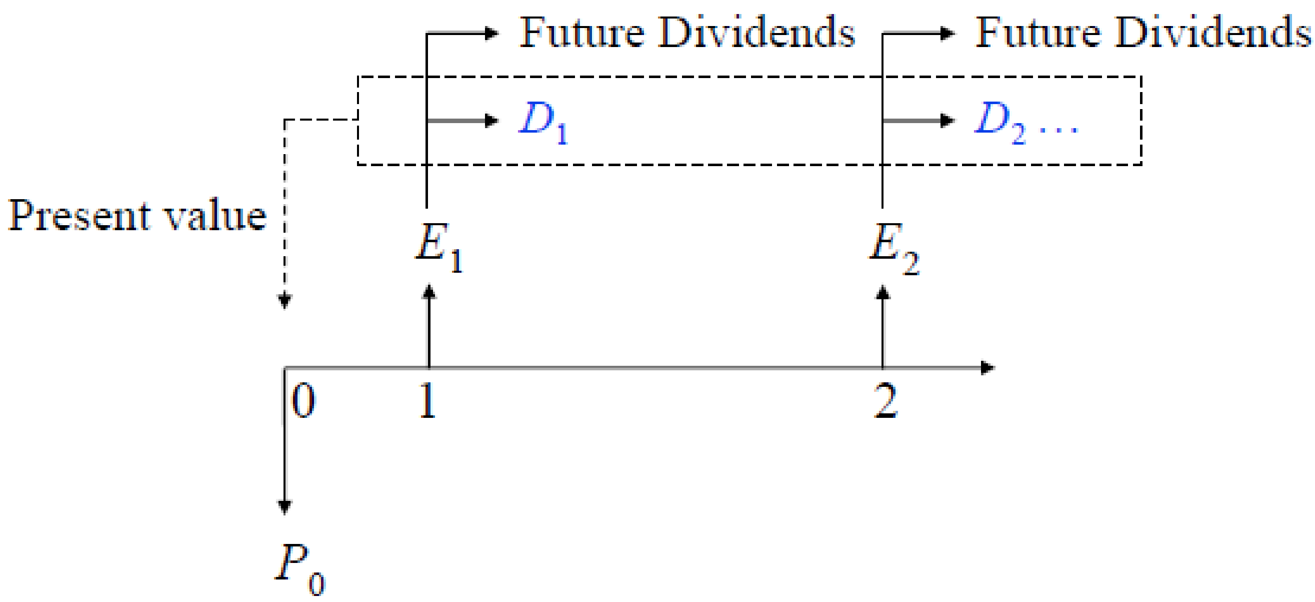
$$\boxed{P_0 = \sum_{t=1}^{N} \frac{CF_t}{(1+k_e)^t}}$$

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*

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

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

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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

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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

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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%)

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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

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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

$P_0 = D_1/(1 + ke) + D_2 /(1 + ke)^2 + (D_3 + P_3)/(1 + ke)^3$
$P_0 = 0.2750/1.1 + 0.3025/1.1^2 + (0.3328 + 6.988)/1.1^3 = \$6.00$

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Earnings, Dividends and Prices

A P/E multiple (or ratio) is the ratio of the current market price to expected earnings per share

Expected P/E ratio = P_0/E_1 and current P/E ratio = P_0/E_0

The expected P/E ratio is defined as the amount investors are willing to pay for \$1.00 of future expected earnings Assume a fraction α (the dividend payout ratio) of earnings is distributed as dividends in year 1

$D_1 = \alpha E_1$ (Note: $1 - \alpha$ = retention ratio)
Substituting the above in the constant dividend growth mode, we get

$$P_0 = \frac{D_1}{k_e - g} = \frac{\alpha E_1}{k_e - g}$$

$$\frac{P_0}{E_1} = \frac{\alpha}{k_e - g} \quad \text{or} \quad \frac{P_0}{E_0} = \frac{\alpha(1+g)}{k_e - g}$$

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Earnings, Dividends and Prices

Factors driving the P/E ratio
The required rate of return, *ke*
The dividend growth rate, *g*
The dividend payout ratio, α

$$\boxed{\frac{P_0}{E_1} = \frac{\alpha}{k_e - g}}$$

P/E ratio rises as:

- The required rate of return falls
- The growth rate of dividends rises
- The payout ratio rises

Note the interaction between the growth rate of dividends and the payout ratio

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Growth Opportunities

Application 3: Telstra's earnings per share in 2005 is expected to be \$0.343. Its dividend payout ratio is expected to be 75.8%.
Assume that these earnings per share are expected to grow at 5% and the required return on Telstra's shares is 10% p.a.

Estimate the following
a) The firm's current price
b) The firm's P/E ratio
c) The value that can be attached to the firm's future growth opportunities

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Growth Opportunities

a) Payout ratio, α = 0.758 and growth in dividends, g =

$$P_0 = \frac{\alpha E_1}{k_e - g} = \frac{0.758 \times 0.343}{0.10 - 0.05} = \$5.20$$

b) P/E ratio = 5.20/0.343 = 15.2

c) If g = 0 and α = 1.00, we have

$$P_0 = \frac{E_1}{k_e} + PVGO \qquad (Note\text{: } P_0 = E_1/k_e \text{ only if } \alpha = 1 \text{ \underline{and} } g = 0)$$

$$P_0 = \frac{\alpha E_1}{k_e - g} = \frac{E_1}{k_e} = \frac{0.343}{0.10} = \$3.43$$

The difference of \$5.20 - \$3.43 = \$1.77 can be attributed to the present value of growth opportunities (PVGO)

In general, we have

$$P_0 = \frac{E_1}{k_e} + PVGO \qquad (Note\text{: } P_0 = E_1/k_e \text{ only if } \alpha = 1 \text{ \underline{and} } g = 0)$$

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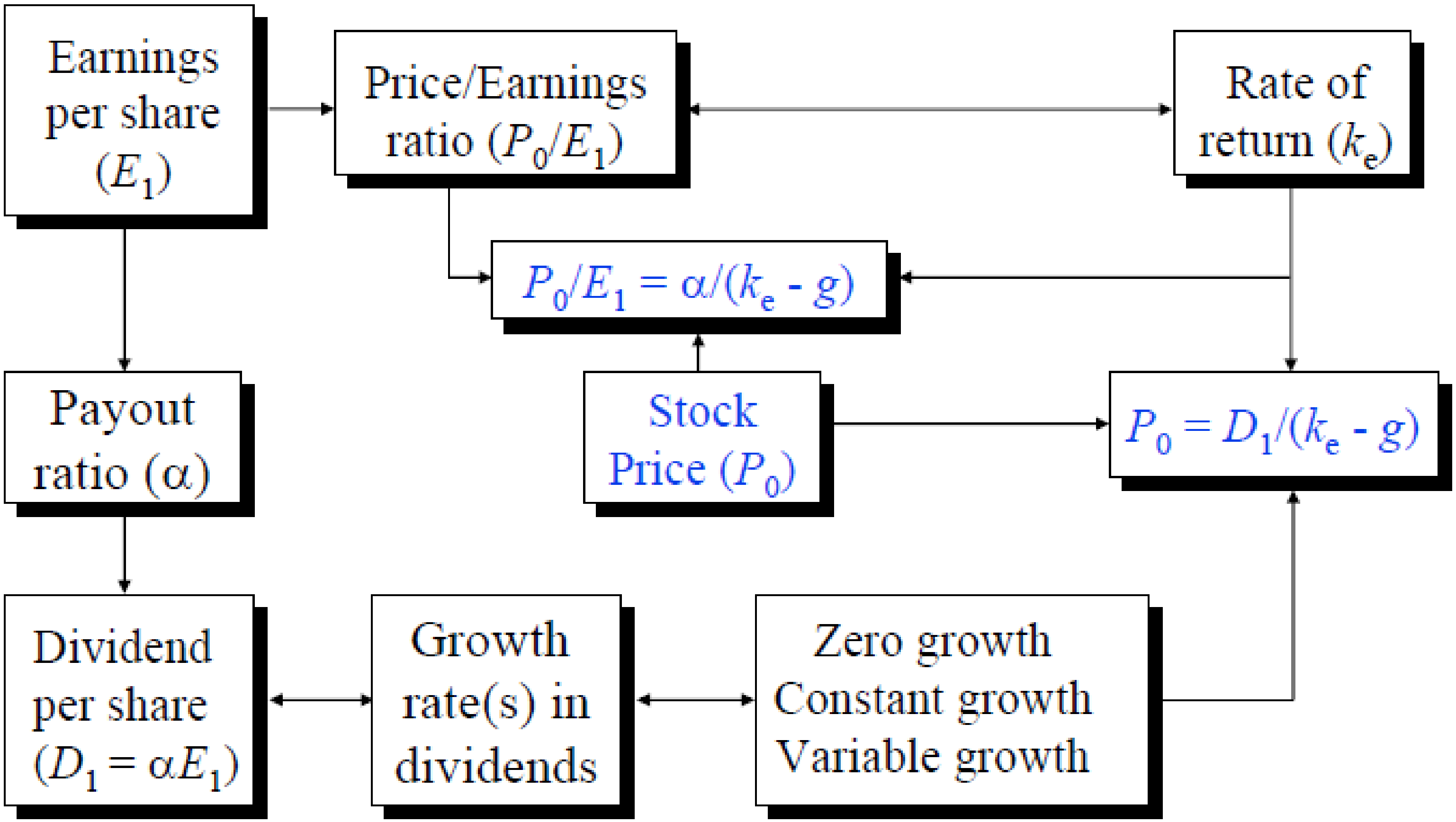
Putting it all Together



Key Concepts

- Ordinary shares provide an infinite stream of uncertain cash flows and have no maturity date

- In any period, the current price of an ordinary share equals the present value of the expected dividend and price in the next period

- Ordinary shares are typically priced based on some assumption about future growth rates in dividends - zero growth, constant growth and variable growth

- Today's share price can also be viewed as the present value of the expected earnings per share plus the present value of growth opportunities

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Key Relationships

- Stock price at time t: $P_t = (D_{t+1} + P_{t+1})/(1 + k_e)$
- Expected return at time t: $k_e = \dfrac{D_{t+1} + P_{t+1}}{P_t} - 1$
- Constant dividend growth model: $P_t = D_{t+1} /(k_e - g)$
- Expected return (constant growth model): $k_e = \dfrac{D_{t+1}}{P_t} + g$
- Expected P/E ratio: $P_0/E_1 = \alpha/(k_e - g)$
- Current P/E ratio: $P_0/E_0 = \alpha(1 + g)/(k_e - g)$
- Present value of growth opportunities: $P_0 = E_1/k_e + PVGO$

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