The Stock Market

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Today's topics

- Initial Public Offerings (IPOs)
- Investing in Stocks
- Valuation of Common Stock
- Errors in Valuation
- How the Market Sets Security Prices
- Stock Market indices

Initial Public Offerings (IPOs)

Stock exchanges trade shares in **listed companies.**

Generally, to become a listed company:
- The company needs to be **well established**
- The company needs to be large enough to **attract sufficient trading in their shares**

A company goes public when shares are offered to the public for the first time

Raises Money

The Facebook IPO raised around $16 billion: $7billion for the company and the other $9 billion for some earlier investors to sell some, or all, of their shares.

Increases the public profile and awareness of the company

Increases liquidit

After an IPO, shares are much easier to buy or sell as they are now traded on a stock exchange

Investing in Stocks

1. Represents ownership in a firm

2. Earn a return in two ways
   - Price of the stock rises over time
   - Dividends are paid to the stockholder

3. Stockholders have claim on all assets

4. Right to vote for directors and on certain issues

5. Two types
   - Common stock
     - Right to vote
     - Receive dividends
   - Preferred stock
     - Receive a fixed dividend
     - Do not usually vote

Investing in Stocks: Sample Corporate Stock Certificate

Valuation of Common Stock

- The value of any asset is the present value of its expected future cash flows

- Valuing common stock is, in theory, no different from valuing debt securities:
  - determine the cash flows
  - discount them to the present

- Stock ownership produces cash flows from:
  - Dividends
  - Capital Gains

Equity valuation: three scenarios

- This approach to valuing stock is based on the *Dividend Growth Model*

- It has three variants depending on the assumptions (forecasts) we have about the growth of earnings (dividends):
  - Zero Growth
  - Constant Growth
  - Differential Growth
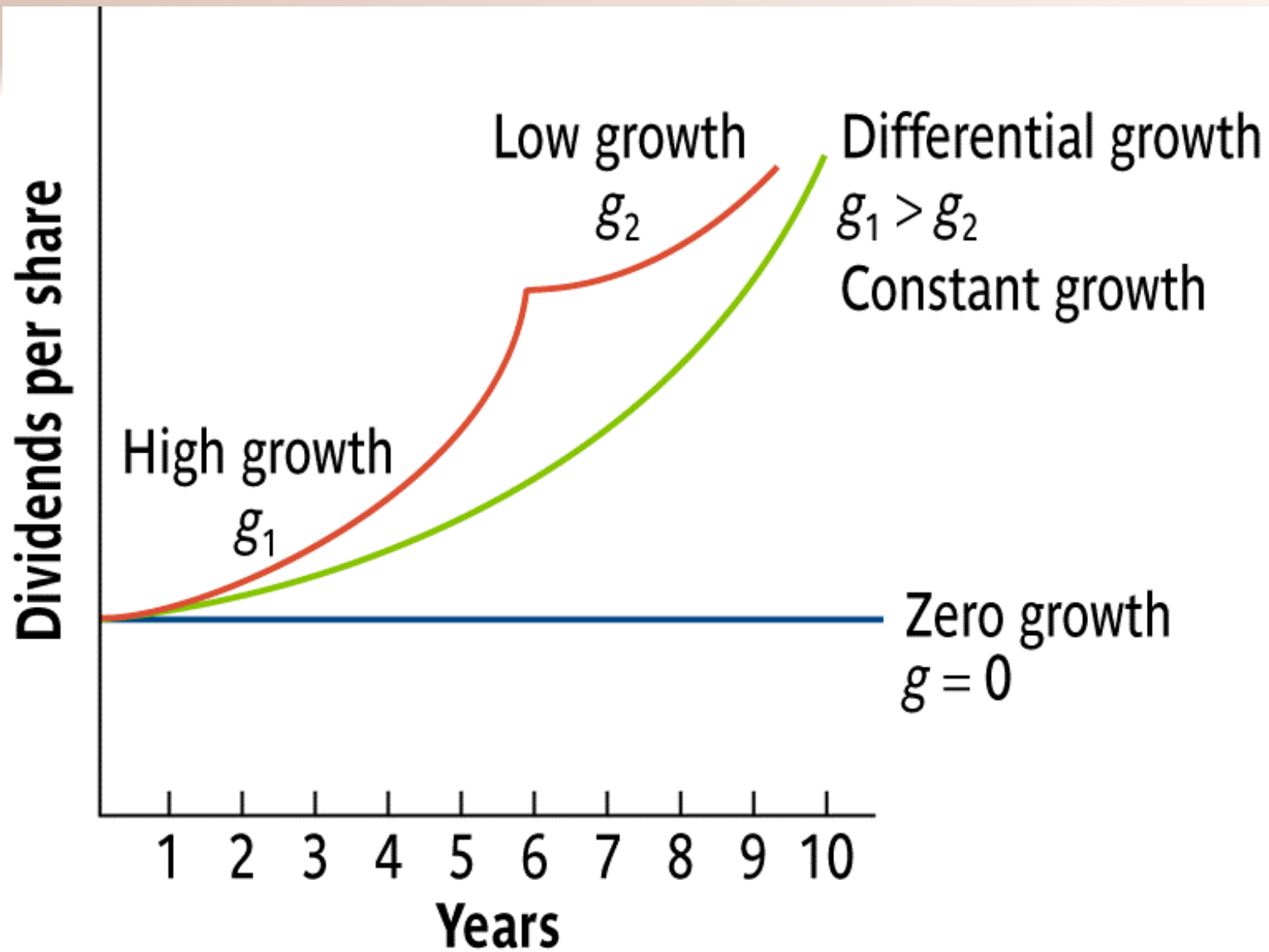
Dividend growth models:

$$\text{Zero growth: } P_0 = \frac{Div_1}{R}$$

$$\text{Constant growth: } P_0 = \frac{Div_1}{R - g}$$

$$\text{Differential growth: } P_0 = \sum_{t=1}^{T} \frac{Div(1 + g_1)^t}{(1 + R)^t} + \frac{\dfrac{Div_{T+1}}{R - g_2}}{(1 + R)^T}$$

Case 1: Zero Growth

- Assume that dividends will remain at the same level forever

$$\text{Div}_1 = \text{Div}_2 = \text{Div}_3 = \cdots$$

- Since future cash flows are constant, the value of a zero growth stock is the present value of a perpetuity:

$$P_0 = \frac{\text{Div}_1}{(1+R)^1} + \frac{\text{Div}_2}{(1+R)^2} + \frac{\text{Div}_3}{(1+R)^3} + \cdots$$

$$P_0 = \frac{\text{Div}}{R}$$

Case 2: Constant Growth

Assume that dividends will grow at a constant rate, g, forever, *i.e.*,

$$\mathrm{Div}_1 = \mathrm{Div}_0(1+g)$$

$$\mathrm{Div}_2 = \mathrm{Div}_1(1+g) = \mathrm{Div}_0(1+g)^2$$

$$\mathrm{Div}_3 = \mathrm{Div}_2(1+g) = \mathrm{Div}_0(1+g)^3 \dots$$

Since future cash flows grow at a constant rate forever, the value of a constant growth stock is the present value of a growing perpetuity:

$$P_0 = \frac{\mathrm{Div}_1}{R-g}$$

Constant Growth Example

- Suppose ABC, Ltd., just paid a dividend of £.50. It is expected to increase its dividend by 2% per year. If the market requires a return of 15% on assets of this risk level, how much should the stock be selling for?

- P_0 = .50(1+.02) / (.15 - .02) = £3.92

Case 3: Differential Growth

- Assume that dividends will grow at different rates in the foreseeable future and then will grow at a constant rate thereafter

- To value a Differential Growth Stock, we need to:

  – Estimate future dividends in the foreseeable future

  – Estimate the future stock price when the stock becomes a Constant Growth Stock (case 2)

  – Compute the total present value of the estimated future dividends and future stock price at the appropriate discount rate

Case 3: Differential Growth

- Assume that dividends will grow at rate g_1 for N years and grow at rate g_2 thereafter.

$$\mathrm{Div}_1 = \mathrm{Div}_0(1 + g_1)$$

$$\mathrm{Div}_2 = \mathrm{Div}_1(1 + g_1) = \mathrm{Div}_0(1 + g_1)^2$$

$$\ldots$$

$$\mathrm{Div}_N = \mathrm{Div}_{N-1}(1 + g_1) = \mathrm{Div}_0(1 + g_1)^N$$

$$\mathrm{Div}_{N+1} = \mathrm{Div}_N(1 + g_2) = \mathrm{Div}_0(1 + g_1)^N(1 + g_2)$$

$$\ldots$$

Case 3: Differential Growth

Dividends will grow at rate g_1 for N years and grow at rate g_2 thereafter

$$\text{Div}_0(1+g_1) \qquad \text{Div}_0(1+g_1)^2$$

$$\vdash\!\!\!-\!\!\!+\!\!\!-\!\!\!-\!\!\!+\!\!\!-\!\!\!\dashv \quad \cdots$$

0   1   2

$$\text{Div}_N(1+g_2)$$

$$\text{Div}_0(1+g_1)^N$$

$$= \text{Div}_0(1+g_1)^N(1+g_2)$$

$$\cdots \quad \vdash\!\!\!-\!\!\!+\!\!\!-\!\!\!-\!\!\!-\!\!\!-\!\!\!-\!\!\!-\!\!\!+\!\!\!-\!\!\!\dashv \quad \cdots$$

N N+1

Case 3: Differential Growth

We can value this as the sum of:

- an *N*-year annuity growing at rate g_1

$$P_A = \frac{Div_1}{R - g_1}\left[1 - \frac{(1 + g_1)^N}{(1 + R)^N}\right]$$

- plus the discounted value of a perpetuity growing at rate g_2 that starts in year *N+1*

$$P_B = \frac{\left(\dfrac{\text{Div}_{N+1}}{R - g_2}\right)}{(1 + R)^N}$$

Case 3: Differential Growth

Consolidating gives:

$$P = \frac{Div_1}{R-g_1}\left[1 - \frac{(1+g_1)^N}{(1+R)^N}\right] + \frac{\frac{Div_{N+1}}{R-g_2}}{(1+R)^N}$$

Or, we can "cash flow" it out.

A Differential Growth Example

A common stock just paid a dividend of £2. The dividend is expected to grow at 8% for 3 years, then it will grow at 4% in perpetuity.

What is the stock worth if the discount rate is 12%?

With the Formula

$$P = \frac{£2 \times (1.08)}{.12 - .08}\left[1 - \frac{(1.08)^3}{(1.12)^3}\right] + \frac{\left(\dfrac{£2(1.08)^3(1.04)}{.12 - .04}\right)}{(1.12)^3}$$

$$P = £54 \times [1 - .8966] + \frac{(£32.75)}{(1.12)^3}$$

$$P = £5.58 + £23.31 \qquad\qquad P = £28.89$$

With Cash Flows

$£2(1.08)$ $£2(1.08)^2$ $£2(1.08)^3$ $£2(1.08)^3(1.04)$

|───────────|───────────|───────────|───────|────── …

0   1   2   3   4

The constant growth phase beginning in year 4 can be valued as a growing perpetuity *at time 3*.

$£2.16$ $£2.33$ $£2.52 + \dfrac{£2.62}{.08}$

|───────────|───────────|───────────|

0   1   2   3
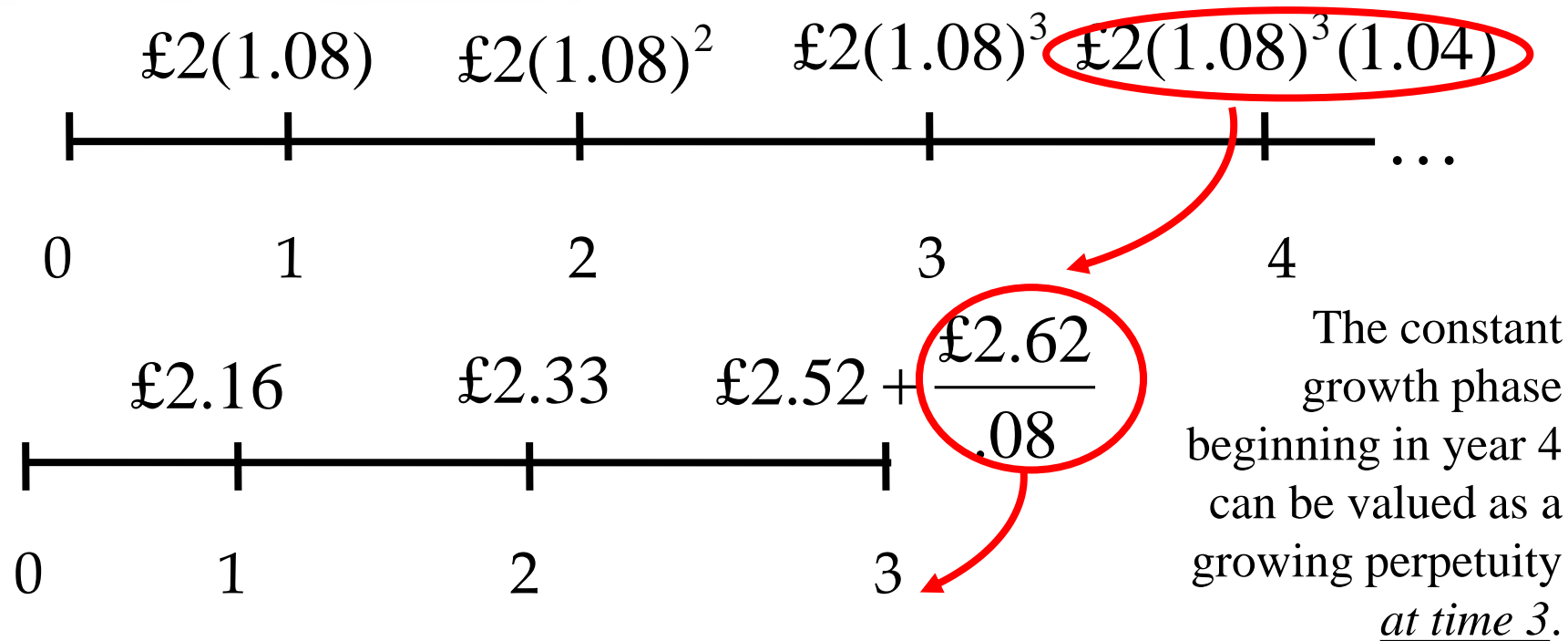
$$P_0 = \frac{£2.16}{1.12} + \frac{£2.33}{(1.12)^2} + \frac{£2.52 + £32.75}{(1.12)^3} = £28.89$$

$$P_3 = \frac{£2.62}{.08} = £32.75$$

Estimates of Parameters

- Dividend Growth Model
- The value of a firm depends upon the rate of growth of earnings, g, and its discount rate, R
- So
  - Where does g come from?
  - Where does R come from?

Where Does g Come From?

$g =$ Retention ratio × Return on Earnings

- Pagemaster plc just reported earnings of £2 million. It plans to retain 40 percent of its earnings. The historical return on equity (ROE) has been 16 percent, a figure that is expected to continue into the future.

- How much will earnings grow over the coming year?

$g =$ Retention ratio × ROE

$g = .4 × .16 = .064$

Errors in Valuation: Dividend growth rates

Stock Prices for a Security with D_0 = $2.00, R = 15%, and Constant Growth Rates (g) as Listed

Growth (%)	Price ($)
1	14.43
3	17.17
5	21.00
10	44.00
11	55.50
12	74.67
13	113.00
14	228.00

Where does *R* come from?

- The discount rate can be broken into two parts.
  - The dividend yield
  - The growth rate (in dividends)
- In practice, there is a great deal of estimation error involved in estimating *R*.

- Stock prices could be very different with variation of R.

Errors in Valuation: Required returns

Stock Prices for a Security with $D_0 = \$2.00$, $g = 5\%$, and Required Returns as Listed

Required Return (%)	Price ($)
10	42.00
11	35.00
12	30.00
13	26.25
14	23.33
15	21.00

How the Market Sets Security Prices

- Generally speaking, prices are set in competitive markets as the price set by the buyer willing to pay the most for an item.

- The buyer willing to pay the most for an asset is usually the buyer who can make the best use of the asset.

- Superior information can play an important role.

- Consider the following three valuations for a stock with certain dividends but different perceived risk:

Investor	Discount Rate	Stock Price
You	15%	$16.67
Jennifer	12%	$22.22
Bud	7%	$50.00

- Bud, who perceives the lowest risk, is willing to pay the most and will determine the "market" price.

Errors in Valuation

Security valuation is not an exact science!

Considering different growth rates, required rates, etc., is important in determining if a stock is a good value as an investment.

Errors in Valuation

Although the pricing models are useful, market participants frequently encounter problems in using them. Any of these can have a significant impact on price in the Gordon model.

- Problems with Estimating Growth

- Problems with Estimating Risk

- Problems with Forecasting Dividends

Problems with the dividend-based models for valuing stock

- Problem: many (listed or not) companies do not pay dividends…

- Mainstream corporate finance textbook dodge the issue by saying that we (investors and analysts) should expect that the company will **eventually** pay dividends **in the future**

- Even if that is true, it casts a long shadow on all calculations we just made …

- … Which means that the market value of stock really ultimately depends on what others think the value should be

Case: 9/11, Enron and the Market

- Both 9/11 and the Enron scandal were events in 2001.

- Both should lower "g" in the Gordon Growth model - driving down prices.

- Also impacts R - higher uncertainty increases this value, again lowering prices.

- We did observe in both cases that prices in the market fell. And subsequently rebounded as confidence in US markets returned.

Case: The 2007–2009 Financial Crisis and the Stock Market

- The financial crisis, which started in August 2007, was the start of one of the worst bear markets.

- The crisis lowered "g" in the Gordon Growth model - driving down prices.

- Also impacts R - higher uncertainty increases this value, again lowering prices.

- The expectations were still optimistic at the start of the crisis. But, as the reality of the severity of the crisis was understood, prices plummeted.

Stock Exchanges

- Organized exchanges
  - NYSE is best known, with daily volume around 4 billion shares, with peaks at 7 billion.
  - "Organized" used to imply a specific trading location. But computer systems have replaced this idea.
  - Others include the ASE (US), and Nikkei, LSE, DAX (international)
  - Listing requirements exclude small firms
  - Auction markets with floor specialists
  - 25% of trades are filled directly by specialist

OTC

- OTC markets
  - NASDAQ, AIM,
  - Important market for thinly-traded securities—securities that don't trade very often. Without a dealer ready to make a market, the equity would be difficult to trade.
  - Multiple market makers set bid and ask prices
  - Multiple dealers for any given security and stand ready to make a market

Stock Market indices

- Stock market indices are frequently used to monitor the behavior of a groups of stocks.

- Major stock market indices in the U.S. include the Dow Jones Industrial Average, the S&P 500, and the NASDAQ composite.

- There are other global major stock market indices:

Stock Market Indices Examples

UK | FTSE 100

FTSE 100 Index
INDEXFTSE: UKX - 15 Dec 14:48 GMT
6,012.80 ▲138.74 (2.36%)
1 day | 5 day | 1 month | 3 months | 1 year | 5 years | max

'Footsie'
Largest 100 UK companies
Covers **70%** of the UK market value

USA | Dow Jones Industrial Average (DJIA)

Dow Jones Industrial Average
INDEXDJX: .DJI - Dec 15 9:48 AM EST
17,558.84 ▲190.34 (1.10%)
1 day | 5 day | 1 month | 3 months | 1 year | 5 years | max

A narrow view of the US stock market
30 stocks

USA | S&P 500

S&P 500 Index
INDEXSP: .INX - Dec 15 9:50 AM EST
2,049.61 ▲27.67 (1.37%)
1 day | 5 day | 1 month | 3 months | 1 year | 5 years | max

A wider view of the US stock market
500 stocks

China | Hang Seng Index
58 stocks

Hang Seng Index
INDEXHANGSENG: HSI - Dec 15 4:01 PM GMT+8
21,274.37 ▼35.48 (0.17%)
1 day | 5 day | 1 month | 3 months | 1 year | 5 years | max

Germany | DAX
30 stocks

DAX PERFORMANCE-INDEX
INDEXDB: DAX - 15 Dec 15:40 GMT+1
10,470.94 ▲331.60 (3.27%)
1 day | 5 day | 1 month | 3 months | 1 year | 5 years | max

Japan | Nikkei 225
225 stocks

Nikkei 225
INDEXNIKKEI: NI225 - Dec 15 3:00 PM GMT+9
18,565.90 ▼317.52 (1.68%)
1 day | 5 day | 1 month | 3 months | 1 year | 5 years | max

Stock Market Indices

Measures **aggregate price movements** of companies' shares on an exchange Provide a **snapshot of how share prices are performing** in a particular stock market, or across several markets.

Single market indices

Measures price movements of companies' shares listed on one stock exchange

Global market indices

Measures price movements of companies' shares listed on various exchanges internationally

- Investors can **gauge the overall performance of the market**
- Smoothens out anomalies and provide a **consistent picture of the mood across the market**.
- Provides a **benchmark for investors** - assess whether their portfolios of shares are doing better (outperforming) or worse (underperforming) than the market in general.

Summary

- Valuation of Common Stock: various techniques for valuing dividends and earnings were presented

- How the Market Sets Security Prices: the basic idea that prices are set by the "highest bidder" was reviewed

- Errors in Valuation: difficulties in determining dividends, growth rates, and/or required returns can have a significant impact in the pricing models

- Investing in Stocks: we developed an understanding the structure of the various trading systems, including exchanges and OTC markets

Next Topic

- The Foreign Exchange Market

- Mishkin and Eakins (2015) Chapter 15