FINS1613 Notes:

Key characteristics of projects:

Profits and costs (cash flows), determined by the expected amount and expected timing

Uncertainty (risk), described by the possible outcomes from the project

Terminology:

Ownership (the right to share in a firm's profits)

Control (the right to directly manage or elect management of a firm)

Personal liability (the responsibility to pay a firm's financial obligations using personal assets when the firm cannot)

Limited liability (a limit that the owner can only lose the value of their investment when the firm cannot pay its financial obligations)

A *sole trader*, or *sole proprietorship*, is a business owned and controlled by a single person. This person has *personal liability* for the firm; the business ceases existence with death or withdrawal of the sole trader; the business's profits are taxed at a personal level.

A *partnership* is a business owned by several partners. *General partners* share ownership, control, and personal liability; *limited partners* share ownership but have no control and limited liability. Profits are still taxed at a personal level; the business *generally* continues to exist after the death or withdrawal of a *single* general partner.

	Sole trader	**Partnership**	**Limited Partnership**	
Type of owner	N/A	General partner	General partner	Limited partner
Number	One	Several	One or more	Several
Control	Yes	Yes	Yes	No
Liability	Personal	Personal	Personal	Limited
Taxation	Personal	Personal	Personal	Person

Corporations (the main focus of the course) use *shareholders* (many parties who have ownership, no control, and limited liability) to grow the corporation. Corporations are attractive to investors due to limited liability. Shareholders elect a *board of directors*, whose role is to monitor the firm, set high level strategy, and maximise firm value. The board of directors then hire a *chief executive officer* (CEO), who undergoes everyday management of the firm, implements the rules and policies set by the board of directors, and whose role is to maximise firm value. The CEO hires a number of high-level executives including a chief financial officer (CFO). The CFO evaluates investment and financing decisions for the firm; their objective is to maximise firm value. Clearly the ownership of a corporation is by the shareholders, and the control/management of a corporation is by the board of directors, CEO, CFO, executives etc. A corporation is its own legal identity; it is legally distinct from the owners.

An *agency cost* of a firm is a cost that arises where an employee takes an action that serves their own interests instead of maximising firm value, such as stealing, or acting excessively financially

- The terms of the cash flows;
- The rights of investors to enforce payment;
- The ability of investors to influence firm decision making.

Free cash flows to a firm are the cash flows before payments to holders of securities (such as debt or equity). The first payment made after the free cash flows is to holders of bonds (debt securities). When all bond payments are made, the next payment made is to holders of preference shares (equity securities). When all preference share payments are made, the final payment made is to holders of ordinary shares (equity securities). If free cash flows are not sufficient to pay all parties, bond holders are paid their share; if any remains preference shareholders are paid; if any remains from that ordinary shareholders are paid.

A *bond* is a security sold by governments and corporations to raise money from investors today in exchange for promised future payments. The terms of the bond indicate the amounts and dates of all payments to be made; the firm is legally obligated to make payments to bond holders. Failure to pay bond holders triggers administration (Australia, UK) or bankruptcy (US). Bonds are a form of debt financing.

Preference shares are a security sold by corporations to raise money from investors today in exchange for expected future payments. The holders of preference shares receive dividend payments and are paid "in preference to" ordinary shareholders. However, the firm is not legally obligated to make payments to preference shareholders; failure to pay does not trigger legal proceedings. Preference shares are also known as *preferred stock*, and are a form of equity financing.

Ordinary shares are a security sold by corporations to raise money from investors today in exchange for expected future payments. The holders of ordinary (or equity) shares receive dividend payments; these are determined by the company's board of directors, are not guaranteed, and may change over time. Failure to pay does not trigger legal proceedings. Ordinary shares are also known as *common stock* and are a form of equity financing.

The place of ordinary shares in the hierarchy of payment explains in part why investors focus so heavily on ordinary share performance when determining financial performance of a corporation. Even when a company's free cash flows are relatively low, they may still be able to pay holders of bonds and preference shares; the payment to ordinary shareholders will be affected the most. When free cash flows are relatively high, ordinary shareholders will get paid much more. Bonds are the worst security to determine financial performance; non-payment of bonds will not occur unless the corporation goes into administration.

When a firm enters administration (bankruptcy), payments are ordered by *absolute priority*, based on *seniority of securities*. Bond holders are paid first, then preference shareholders, then ordinary shareholders (note that other types of securities also exist, each with its own seniority in absolute priority, but these are not covered in this course).

When a firm is liquidated, payments may be subject to *secured collateral*; bonds may be secured by specific assets of the firm. Absolute priority and collateral decrease the risk of owning debt. Note that during liquidation (and administration), bonds and preference shares are paid at *face value*, not *market value*.

Ordinary share equity is the *residual claim* in a firm's capital structure. It receives cash flows only after payments are made to all other securities. When a firm does poorly, payments to the residual

decreasing its future earnings. In this way, there is a trade-off between the two approaches. Assuming the firm's current earnings remains constant, increase in future earnings results exclusively from new investment, and hence:

Change in earnings = New investment x Return on new investment

The new investment is the firm's earnings multiplied by the *retention rate* (the fraction of current earnings that the firm retains). Note dividend payout rate + retention rate = 1.

New investment = Earnings x Retention rate

- ⇨ Change in earnings = Earnings x Retention rate x Return on new investment
- ⇨ Earnings growth rate = Retention rate x Return on new investment

If the dividend payout rate is kept constant, then dividend growth is equal to earnings growth.

Note that investment is "good" when the return on new investment exceeds the equity cost of capital; it is "bad" when the return on new investment is less than the equity cost of capital.

The constant dividend growth model cannot be used to value shares of most firms, as they often pay no dividends when they are "young" and their growth rate changes over time. However, the general form of the dividend-discount model can be used to value the firm. Recall that under the constant dividend growth model,

$P_0 = \frac{Div_1}{r_E - g}$

This can be modified to start at year n+1 after which growth is expected to be constant:

$P_n = \frac{Div_{n+1}}{r_E - g}$

This P_n value is then used as a final cash flow in the dividend-discount model. Once this price is found, it must be *discounted* and then can be added to the present values of the dividends preceding constant growth (using the regular discounting formula) to find the current price. The dividend-discount model is summarised in this table:

The dividend-discount model

General formula	$P_0 = \frac{Div_1}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + \ldots + \frac{Div_n}{(1+r_E)^n} + \frac{P_n}{(1+r_E)^n}$
If dividend growth is constant	$P_0 = \frac{Div_1}{r_E - g}$
If early growth is variable followed by constant growth	$P_0 = \frac{Div_1}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + \ldots + \frac{Div_n}{(1+r_E)^n} + \left(\frac{1}{(1+r_E)^n}\right)\left(\frac{Div_n(1+g)}{r_E - g}\right)$

There are two fundamental limitations of the dividend-discount model: it is reliant on uncertain dividend forecasts, and it does not apply to non-dividend-paying shares. Even small changes in the dividend growth rate lead to large changes in the estimated share price; the historical rate of dividends is also unreliable. Many companies do not pay dividends; this makes it difficult to value these shares.

Another way for firms to pay earnings to shareholders is through *share repurchases*. This is where the firm uses excess cash to buy back its own shares. In the dividend-discount model, shares were

The *incremental earnings* for project evaluation consist of *changes* in future earnings that are a *direct consequence* of taking the project. *Incremental cash flows* are changes in future cash flows that are a *direct consequence* of taking the project. This is based upon the *stand-alone principle*: an investment is acceptable if the NPV of the *incremental cash flows* is positive.

A *sunk cost* is a cost that has already been incurred and cannot be recovered; these *cannot* be considered in an investment decision. A *side effect* is a cash flow gained or lost in an existing project due to taking on a new project; these *must* be considered in an investment decision, as they impact overall firm value. An *opportunity cost* is the most valuable alternative that is given up if a particular investment is taken; eliminating a future cash flow is equivalent to losing money on the investment. Opportunity costs must *always* be considered in an investment decision. Opportunity costs are useful for addressing profits from mutually exclusive projects.

In finance, we are interested in *cash flow basis accounting*, not *accrual basis accounting*; however, the cash flow alone is not sufficient, because *taxes* are determined from income statements. *Incremental cash flows* are determined under cash flow basis accounting in two ways:

- Directly (by computing gross cash received and paid, requiring the tax payment to be considered in incremental earnings)
- Indirectly (by adjusting incremental earnings for missing cash-related activities)

For calculating incremental earnings, we use *incremental net operating profit* (the change in net operating profit caused by undertaking a project or investment). This is the *incremental operating EBIT* minus *taxes* directly related to the project.

Incremental Earnings = Incremental EBIT (Earnings Before Interest and Tax) x (1 – Tax Rate)

Financing costs are *ignored* in determining incremental earnings, because borrowing and lending do not affect project value; hence financing costs do not factor in the investment decision. Financing decisions are analysed separately.

The *marginal tax rate* is the tax rate a company pays on an *incremental* dollar of pre-tax income; this is the rate used in capital budgeting decisions. *Negative tax payments* occur when a company project has negative *incremental* earnings, creating (marginal) *tax savings*.

Capital expenditures are purchases of new property, plant and equipment. Capital expenditures do not appear as part of incremental earnings, but are cash investments. Hence capital expenditures must be *subtracted* from incremental earnings to find cash flows.

Depreciation is the systemic allocation of the acquisition cost of fixed assets to the expense accounts of periods that benefit from the use of those assets. Depreciation appears as part of incremental earnings, but is not a cash expense. Hence depreciation must be *added* to incremental earnings to find cash flows.

Salvage is the sale of used property, plant, and equipment. Like capital expenditures, salvage does not appear as part of incremental earnings, but is a cash recovery of equipment. Hence salvage must be *added* to incremental earnings to find cash flows.

Inventories are items needed for the continued operation of the business. An increase in inventories is *subtracted* from incremental earnings to find *operating* cash flows.

As debt is tax-deductible, firms do not bear the full cost of the debt. Instead, the *after-tax cost of debt* is given by:

Cost of Debt = $r_D (1 - T_C)$

Where r_D is the yield to maturity and T_C is the firm's tax rate.

Preference shareholders are generally offered a fixed dividend, meaning that their price can be estimated using a constant growth dividend discount model:

$$P_0 = \frac{Div_1}{r_P - g}$$

Hence the cost of preference shares is given by

$$r_P = \frac{Div_1}{P_0} + g$$

The cost of ordinary shares is "simply" found under the CAPM (for security *i*):

$$r_{E,i} = r_f + \beta_i \text{ x Market Risk Premium}$$

Applying the CAPM requires estimates of the risk-free rate (r_f), the market risk premium, and the beta value (β_i). The risk-free rate generally needs to match a *long-term investment horizon*; hence yields on long-term government bonds are used, as cash rates are invalid for long-term estimations. The market risk premium is estimated using *historical values*; most firms use a market risk premium of about 6%. The beta value reflects the systematic risk in the project; historical beta values may be inappropriate for a number of reasons, so firms generally use betas based on the *average of single-industry firms* in the *same industry* as the *project* (not the firm!).

Sample problem:

$r_{WACC} = w_E \text{ x } r_E + w_P \text{ x } r_P + w_D \text{ x } r_D \text{ x } (1 - T_C)$

Market value of debt = \$7 billion

Market value of preference shares = \$17 x 200 million = \$3.4 billion

Market value of equity = \$12 billion

Total market value = \$7 billion + \$3.4 billion + \$12 billion = \$22.4 billion

$$w_D = \frac{7 \text{ billion}}{22.4 \text{ billion}} = 0.3125$$

$$w_P = = \frac{3.4 \text{ billion}}{22.4 \text{ billion}} = 0.1518$$

$$w_E = = \frac{12 \text{ billion}}{22.4 \text{ billion}} = 0.5357$$

$r_D = 0.06$

$$r_P = \frac{Div_1}{P_0} + g$$

$$= \frac{1.5 \text{ x } 1.02}{17} + 0.02$$

$= 0.11$

$r_E = r_f + \beta \text{ x Market Risk Premium}$

taxed. Under an *imputation system*, dividend taxation is *personal tax* based on *pre-tax net profit* (by the company) by using a *credit for corporate tax*.

Example:

With a 30% company tax rate and a 45% marginal personal tax rate:

Under the classical system, for each $1 that the firm earns, they are taxed $0.30. This leave $0.70 to be distributed to the investor, which is taxed at 45%, leaving $0.385 per dollar to the investor after tax.

Under the imputation system, for each $1 that the firm earns, they are taxed $0.30. The investor is then taxed at 45% *of the entire dollar*, leaving them with $0.25 (lost $0.30 through corporate tax and $0.45 through personal tax). They are then given a *franking credit* of $0.30 per dollar (the corporate tax), leaving $0.55 per dollar to the investor after tax.

Tax regimes vary worldwide. Optimal dividend policy suggests that firms should maximise the money received by investors. This means that when the personal tax payable on dividends is less than the personal tax payable on capital gains (usually under a classical tax system), they should distribute payments through dividends. When the personal tax payable on dividends is greater than the personal tax payable on capital gains (usually under an imputation system), they should distribute payments through share repurchases.

Payout policy may also be influenced by *investor perceptions*. Firms "smooth" dividends, setting them at a level they expect to maintain. This is both because investors may prefer stable dividends; and management may prefer to set dividends as a target fraction of earnings. *Dividend signalling* suggests that changes to dividend policy provide information to investors. Dividend cuts suggest that earnings will be lower in the future; dividend increases suggest that earnings will be higher in the future. Share repurchases are a less credible signal than dividends; repurchases are infrequent and irregular, and suggest that the firm is undervalued as management will not purchase overpriced shares.

Dividend franking credits create a *tax benefit* for shareholders similarly to how firms realise cash flow benefits from the tax deductibility of interest payments. However, market practice does *not* adjust for the value of franking credits: this leads to incorrectly high discount rates being used in valuation; this suggests that firms may attach negative values to positive NPV projects, and firms may not invest in positive NPV projects as a result.

THE DISCOUNTED FREE CASH FLOW MODEL FOR A PROJECT (SUMMARY)

1. Estimate incremental earnings, capital expenditures, depreciation, working capital needs, and salvage for a project in order to compute free cash flows.
2. Determine the debt-equity mix and corresponding weighted average cost of capital that captures the appropriate mix of project cash flows (debt: yield to maturity, equity: CAPM with appropriate levered beta, preference shares: implied discount rate from dividend growth model).
3. Compute the NPV and determine whether or not the project is worth pursuing.
4. Determine the project's cash retention and payout policy.