

Orchestrating Organisational Resources (W1)

Sustained Competitive Advantage

- Formal definition:
 - “A firm is said to have a sustained competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors, and when these other firms are unable to duplicate the benefits of this strategy”
- A sustained competitive advantage achieves VRIN:
 - Valuable, Rare, Inimitable, Non-substitutable

Organisational Resources

- All assets, capabilities, organisational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness.
- Resources:
 - People
 - Technology
 - Capital
- We then need to account for these resources
- The combination/orchestration of these resources allows an organisation to achieve a competitive advantage.
- How do we orchestrate resources?

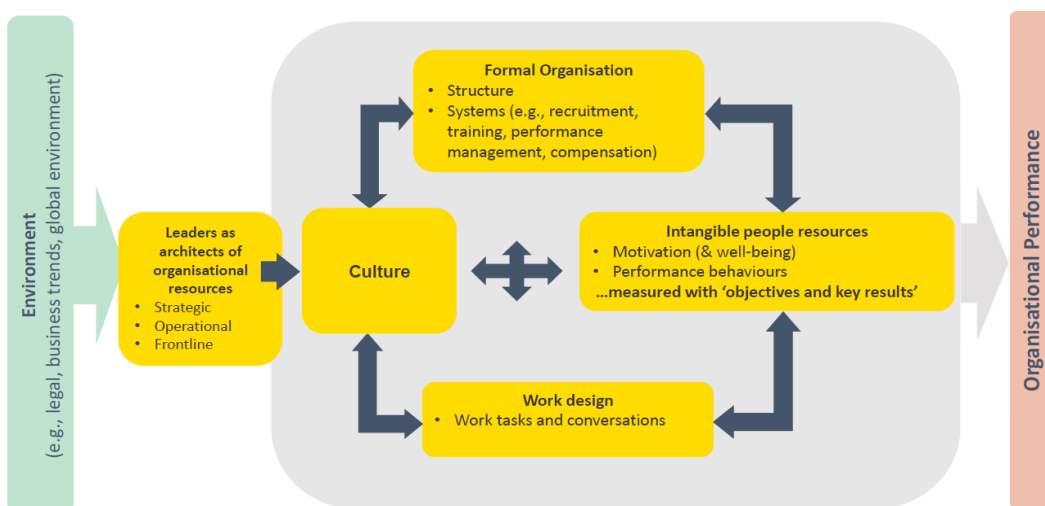
*Identify an issue
faced by the
organisation.*

*Mobilize
action on
this issue*

*Measure
progress and
outcomes*

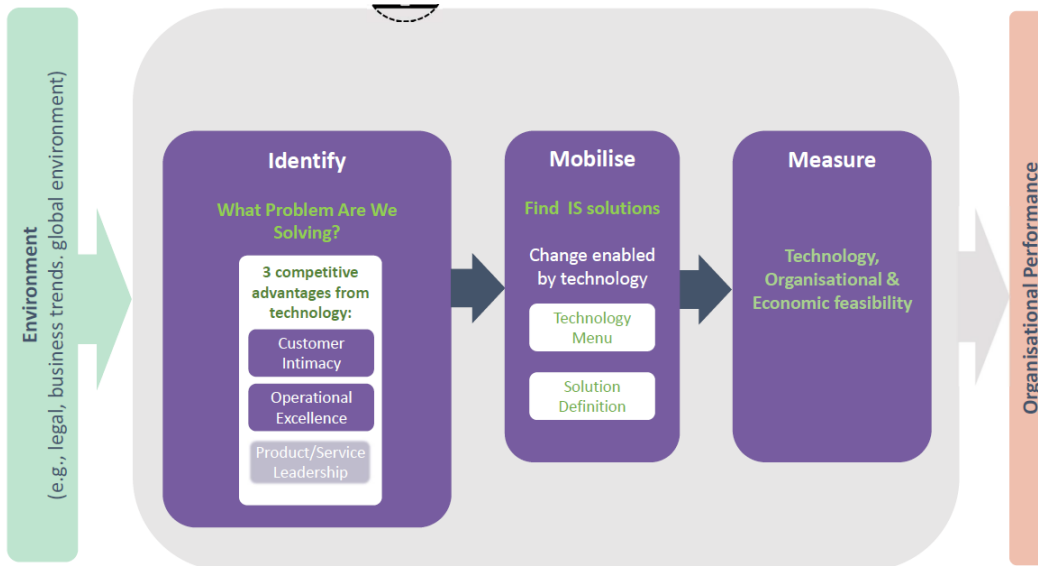
People

- *Managed by Director of HRM & line managers*
- Leaders identify the problem: strategic, operational and frontline
- Mobilise Solutions from the formal organisation, culture and work design
- Measure intangible resources – motivation and performance, with objectives and key results



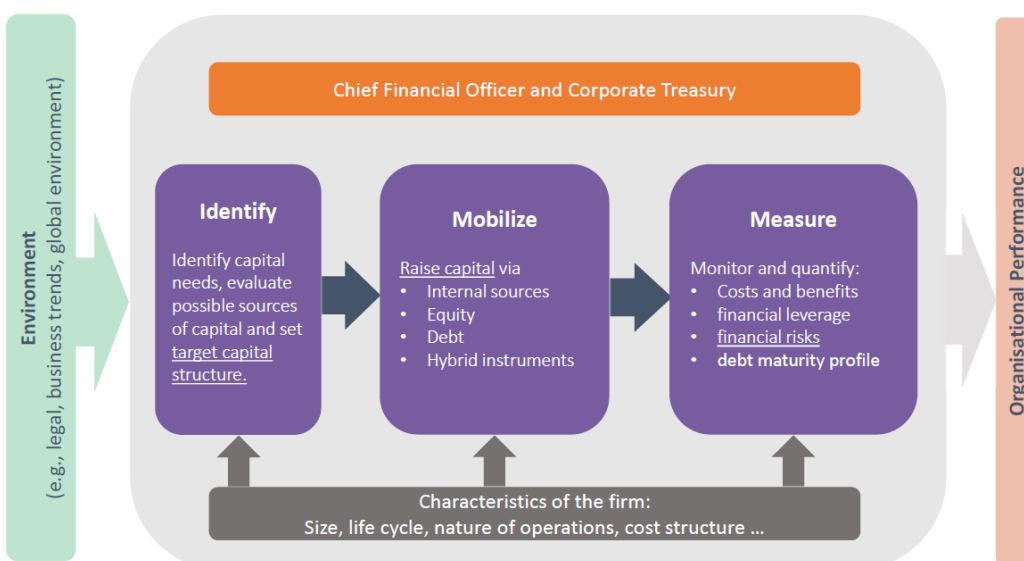
Technology

- *Managed by Chief Information Officer*
- Identify competitive advantage problem
- Mobilising solutions with 'technology menu' & 'solution definitions'
- Measure 'TOE' implications – technological, organisational & economic



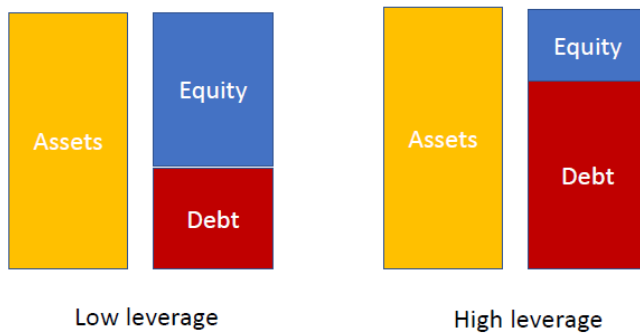
Capital

- *Managed by Chief Financial Officer & Corporate Treasury*
- Identify capital needs and set target capital structure
- Mobilise by raising capital: internal sources, equity, debt and hybrid instruments
- Measure capital costs and benefits, financial leverage, financial risks and debt maturity profile

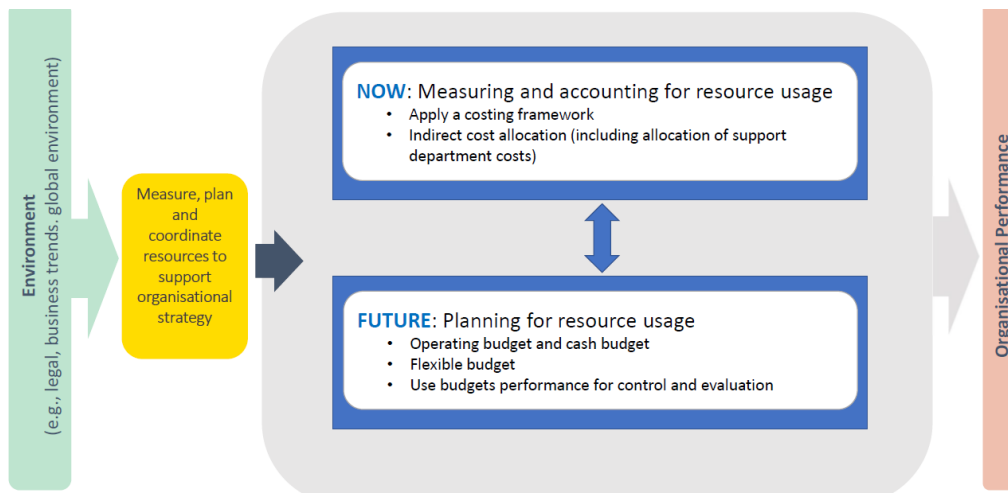


The Capital Structure Trade-off

- Capital Structure is the mixture of debt and equity maintained by a firm.
- Adding debt to the firm introduces certain benefits and certain costs and risks, resulting in a trade-off.

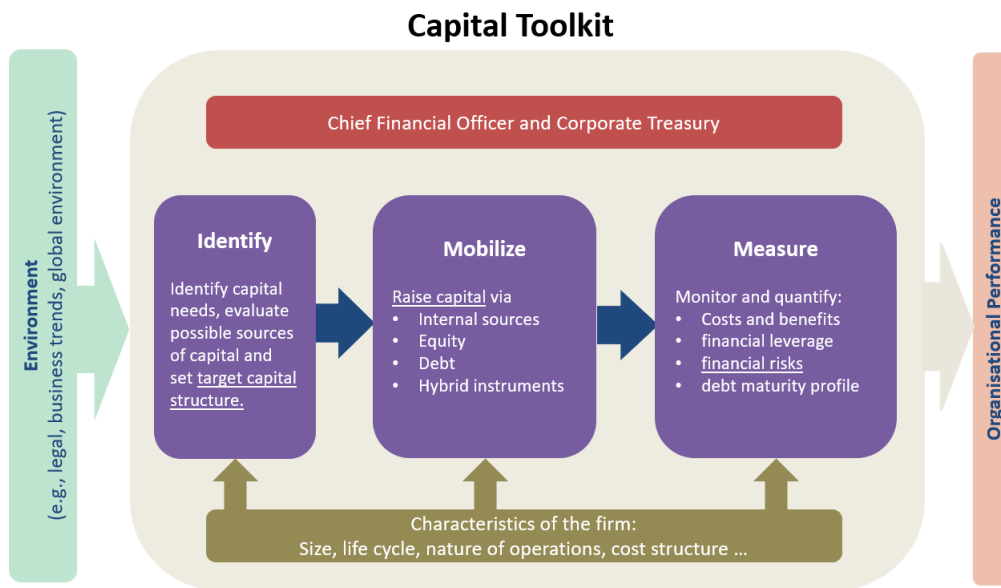


Accounting Toolkit



Capital (W7+8)

Introduction to Capital Raising



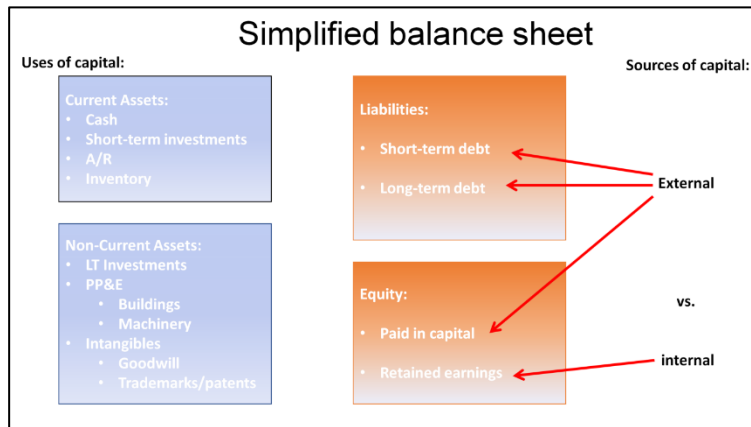
- Young, small start-up firms:
 - These are unlikely to be able to tap into listed equity markets. Instead, they need to attract the attention of investors that are specialized in dealing with start-up companies. Venture capital firms.
- Firms with a track record of growth and exciting prospects:
 - Firms with a track record of growth and exciting prospects typically eventually make the jump onto a public exchange via IPO. This allows them to access a wider variety of funding options both in the form of equity and debt.
- Established Firms:
 - Established firms that have been listed for some time can continue to access equity by selling some additional shares through seasoned equity offerings (SEO) or a rights issues.

The Resource Capital

A Balance Sheet Perspective

- Balance sheet provides insight into the historical sources of funding.
- There are 4 basic sources:
 - Outstanding debt, short and long-term
 - Previously issued equity
 - Preferred Equity

- Retained Earnings



A Cash flow or Income Statement Perspective

- A firm has many uses for funding in its operations and for investment:
 - Ongoing expansion
 - Expansion of net working capital
 - Capital expenses (e.g. multi-year investment property, plant & equipment)
- A healthy business should be able to satisfy most of these capital needs from ongoing operations (i.e. revenue)
- Only beyond these means will the firm be forced to access outside capital sources.

Types of Outside Capital

- Capital can come in many different forms. The two main classes of capital are **equity** and **debt**.
- They differ along 2 dimensions:
 - Cash flow rights
 - Ownership rights

The perspective of an Investor

Return ON and OF Capital

- When you deposit funds in a savings account you have the expectation that:
 - You will receive periodic interest
 - You will receive the original back at a specified future date
- Similarly, when you invest in shares, you have some expectation that:
 - You will receive dividends eventually
 - Your investment will grow over time
 - You can sell the shares in the market to receive some of your investment back

Consequences for the Firm

- What the investor thinks of as required rate of return, becomes a cost to the firm. The so-called **cost of capital**.
 - Interest received by bond investors is interest paid by the company
 - Equity investors demand a total return that will come as a mix of dividends and price appreciation.
- Some aspects of riskiness of the firms type of capital are outside the firms' control
- However, firm managers can clearly influence other aspects of the firm-specific risk through the choice of projects they invest in, how they communicate with investors and how they have behaved in the past.

Venture Capital (VC)

- VC is a part of the larger private equity market and describes early stage, high risk equity financing of young firms.
- Typically, these firms turn to investors of their own to collect money, which is then used to acquire stakes in many target firms.
 - Such a pool would be called a VC fund
- A VC firm will manage several funds (similar structure to hedge funds)
- Investors pay an annual management fee as a function of assets
- Examples:
 - Australian VCs: Blackbird Venture, Brandon Capital
 - US-based VCs: Sequoia Capital, Founders Fund

Funding Rounds

- Funding is typically done in 'funding rounds'.
 - Several points in time where outside investors pour additional funds into the firm in exchange for equity stakes at hopefully expanding valuations.
 - Over time, the original owners are heavily diluted.

Example:

Founders start with a good idea and some of their own capital, build out an idea into something that angel investors are willing to invest \$0.5m in at a \$1.5m pre-money valuation. Pre-money means what the company is worth at that moment without the external funding about to be raised. The post-money valuation is the value of the firm after adding the new funds, in this case \$2m. This first round might be called a seeding round:

Seeding Round



The founders now own 75% of the firm and angel investors own 25%. While in this first step, these numbers are pretty obvious, we can formally keep track of the ownership stake OS_i of an existing investor i during a funding round with the following formula:

$$OS_{i,post} = OS_{i,pre} \frac{V_{pre}}{V_{post}}$$

where subscripts pre and post refer to before and after the funding and V refers to firm values. The ratio $\frac{V_{pre}}{V_{post}}$ could be called the dilution factor due to the fresh capital that is flowing in in exchange for a stake in the company.

In the first round, we have:

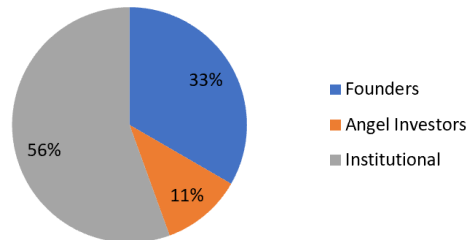
$$OS_{Founders,post} = OS_{Founders,pre} \frac{V_{pre}}{V_{post}} = 100\% \frac{\$1.5m}{\$2m} = 75\%$$

Sometime later, the business has grown in value to \$4m but will need additional funding. The founders are able to gain the attention of some professional investors. A venture capital fund contributes \$2m at a \$4m pre-money

valuation (\$6m post-money), resulting in a dilution factor of 4/6. There are no rules on how to name these rounds, but let us call it series A.

Sometime later, the business has grown by another 50% before another capital injection is needed. A new set of institutional investors contribute another \$4.5m at a \$9m pre-money valuation (post-money \$13.5m).

Series B



The business has now gone from \$1.5m to \$13.5m, i.e., it has grown nine-fold, or in VC-speak 9X since the first funding round. The founders' dollar wealth has gone from \$1.5m to \$4.5m, i.e., 3X. The stark difference occurs because of the heavily shrinking ownership by founders due to new investors owning more and more of the business. This is called dilution.

In finance, the same fact is more commonly and more correctly expressed in terms of (percentage) returns. Generally,

$$Return_t = \frac{V_t - V_0}{V_0} = \frac{V_t}{V_0} - 1$$

In our case, $V_0 = 1.5$ and $V_{afterB} = 4.5$, thus

$$Return = \frac{4.5}{1.5} - 1 = 2 = 200\%$$

Note: The founders tripled their money, hence is grew by 200%.

Venture Capital Investment Options

- Institutional investors are careful to limit their risk of loss and, depending on their bargaining power with the founders, will demand special treatment on their investments relative to the shares of the founders:
 - Preference shares enjoy seniority over common shares, as well as potentially different voting power.
 - Convertible preference shares have the option to convert into common shares
 - Convertible debt enjoys even higher seniority than any equity-like claims while it remains debt. At some future point in time, debtholders may decide to convert their stake into equity to acquire ownership and voting rights, often at discounted prices. However, this early-stage convertible debt often carries low or even no interest at all.

Going Public

The IPO Process

- The process of going public is called the initial public offering (IPO)
- The process comes with stringent requirements in order to protect ordinary investors from fraud:
 - Management must obtain approval from the board of directors.
 - Management obtains expert opinions on a range of matters (legal, risks etc.)
 - Management hires one or several underwriters (explained further below).

- Lawyers prepare a prospectus according to the rules of the jurisdiction that the company intends to list in. The prospectus is a legal document filed with the local security market regulator, for example, ASIC or its New Zealand equivalent, NZSC, that discloses all material information required by the corporation's law concerning the firm making a public offering.
- The regulator examines the prospectus and approves it. The time between filing and regulatory approval is called the registration period.
- Management embarks on an "Investor road show" to drum up demand of institutional investors and to do the "book-building" (receiving bids for shares).

Types of IPOs

- Not all shares are sold to the public during an IPO. There are primary and secondary IPOs.
 - Primary IPO: The company creates new shares and raise funds by selling them
 - Secondary IPO: Existing early investors may sell a portion of their shares as an "exit" from their investment

Underwriting and IPO Costs

- Underwriters are investment firms that act as intermediaries between a company selling securities and the investing public during the IPO.
- Underwriters devise the method used to issue securities, price the securities and sell them to their institutional clients.
- In a so-called standby underwriting arrangement, when not all shares can be placed with the public, underwriters agree to buy the remainder themselves.
 - In the alternative arrangement, the best efforts underwriting, the risk of unsold shares remains with the issuing company.
- The underwriting/IPO process is costly to the issuing firm:
 - The underwriting fee alone ranges between 2.5% and 8% of the amount of funds raised in Australia (2016).
 - The IPO process can also involve very large fixed costs: lawyers, accountants, compliance, exchange listing fees etc.

Example:

Let's say a company wants to raise $NC = A\$10$ million in fresh net capital for the firm. Its underwriters want a $u = 5\%$ cut of total funds raised and fixed costs amount to another $FC = A\$1$ million. How much money will investors have to be willing to contribute?

X is the amount we are looking for and u is the underwriting fee. Net of costs, the firm gets $X \cdot (1 - u) - FC$. Set this equal to NC and solve for X .

$$X = \frac{NC + FC}{1 - u} = \frac{\$11m}{1 - 0.05} = \$11.58 \text{million.}$$

IPO Under-pricing

- On average, stock prices experience large positive returns on the first day of listing. This amounts regularly to 50 or 100%
- In other words, shares are typically under-priced relative to the value that the public market assigns to them in the days of listing.
- Reasons:
 - It is generally difficult to price an IPO because there is not yet a market price and uncertainty is high on all sides
 - There is an information asymmetry associated with companies going public: Company insiders know the firm's prospects much better than the public due to lack of publicly available information

- Underwriters face a two-sided market (the issuer and the investors) and need to please both.

Pros and Cons of going Public

Advantages	Disadvantages
<ul style="list-style-type: none"> • Allows early investors to exit to benefit from the risks they have taken. • Private firms can only have a certain number of shareholders. A wider shareholder base changes the bargaining power of the firm in favour of the firm. • The company gains wider access to capital markets including debt markets. • Higher profile and status. • Public firms are likely to be covered by analysts reducing the information asymmetry. • Shareholders benefit from the liquidity of public markets. • Several of the above reasons indirectly lower the cost of capital for the firm. 	<ul style="list-style-type: none"> • If the founders further dilute their own ownership, they may lose control. • Obligation to file public reports that divulge important information like key suppliers. • High regulatory, compliance costs. • More public scrutiny when the company or its staff misbehave.

Long-term Debt Issuance

- Types of debt:
 - Bank loans
 - On-demand bank loans from a bank
 - Private debt
 - Public debt

Bonds

- Bonds are issued by many entities such as governments and corporations
- In Australia, both government bonds and corporate debentures are traded on an electronic exchange
- Most bonds are coupon bonds, which means that they pay regular coupons, interest payments.
- The coupons are set at bond issuance and do not change over the life of the bond.
 - Zero-coupon bonds do not pay any coupons.
- Almost universally in all bond markets, the coupon is paid in 2 equal instalments per year. The last payment coincides with the return of the principal to investors.
- The annual coupon rate is given as percentage of face value.
- Bonds can have a lot of optional features that change their behaviour:
 - Bonds can be **callable**: The issuer has the right to redeem debt before maturity.
 - Bonds can be **convertible**: The bondholder has the right to exchange into equity at a pre-set ratio. Convertible bonds are one type of hybrid securities, possessing characteristics of both debt and equity.

Loan and Bond Covenants

- Covenants are protections for the creditor written into the contracts of bonds and loans.
- They are strictly monitored by banks and, in some cases, bondholders.
- However, the low interest rates in the last 10-12 years have substantially shifted the bargaining power towards the issuers and away from creditors.
- Many issuers can get away with issuing “Covenant lite bonds” with little creditor protection.
- Covenants restrict the business and financial activities of the borrowing firm. Positive covenants require borrower to take a prescribed actions (e.g. maintain a minimum level of working capital).

- Negative covenants restrict the activities and financial structure of borrower (e.g. do not exceed a maximum debt to equity ratio; do not fall below a minimum working-capital ratio).
- Breaches of covenants result in technical default of the loan contract, entitling lenders to take certain actions such as demand immediate repayment, fines or a declaration of bankruptcy.

Short-term Debt Financing

- There are plenty of short-term financing options available, although whether an individual firm has access to them depends as usual on its perceived risk profile.
- Some benefits of short-term financing:
 - Lower interest rates than long-term debt
 - Flexibility to quickly scale up or down as required by the borrower
- Downside:
 - Most of the time, rolling over short-term debt is nearly automatic, but when credit risk suddenly rises, it may not be

Discount Securities

- Discount securities are short-term debt instruments (maturity <1 year) that do not explicitly pay interest.
- Instead, relative to the face value of the security, the initial issuance price of the instrument is discounted, or reduced in price.
- The borrower gets less than the face value today but pays back the full face value at maturity. Thus, the interest is “baked into” the price difference.
- This allows the LENDER to make a profit/return on his loan.
- Types of discount securities:
 - Commercial bills
 - Promissory Notes
 - Bank overdraft

Accounts Receivable Financing

- Accounts Receivable are a significant asset on some firms' balance sheets and represent expected future payments for goods already delivered to customers.
- However, companies often struggle to transform them into cash in a timely manner as customers are slow to pay them.
- Ways to transform them into liquidity more quickly:
 - **Explicit A/R financing:** A specialized finance company lends against A/R found to be in good standing. This is a loan secured specifically by the firm's A/R, but the firm is still responsible for managing the A/R book.
 - **Factoring:** The firm actually sells their A/R to a factoring company, who then takes over the management of the A/R. Sale often occurs at a very significant discount! The live lecture will discuss a way to calculate this discount for a similar method.

Additional Ways to Raise Equity Capital

Seasoned Equity Offering (SEO)

- Similar to an IPO
- Issue additional new shares to raise new funds for company
- Founders and/or early VCs sell big blocks of their existing shares

- Typically offered to institutional investors.

Private Placement

- Similar to SEO
- An exclusive issue of new securities to an investor or small group of investors
- Regulatory limits on the amount to be raised
- Must come with a right issue on the same terms at the same time

Example: (SEO Placement)

You firm has 50,000 shares outstanding at \$20 each. You need \$200,000 in fresh capital. You decide to raise an SEO @ price = \$16 (20% discount to previous closing price). What are the number of shares and relevant prices after issuance?

Solution:

$\$200,000 / \$16 = 12,500$ new shares for a new total of 62,500 shares.

Value of firm after raise = $\$20 \times 50,000 + \$16 \times 12,500 = \$1,200,000$

New share price = $\$1,200,000 / 62,500 = \19.20

Bad for existing investors! New investors got a discount, less money is raised, per share value drops!

Placement/SEO Valuation

- Before the placement/SEO, there were N_0 shares outstanding. During the capital raising, the firm issued ΔN more. The pre-announcement price is P_{pre} and the subscription price is P_{sub} .

The pre-money value of the firm is $V_0 = N_0 \times P_{pre}$.

Total funds raised (ignoring fees) is $\Delta V = \Delta N \times P_{sub}$.

The post-money value of the firm is $V_1 = V_0 + \Delta V$ and there are $N_1 = N_0 + \Delta N$ shares in total now.

Then the new share price is the weighted average of the two prices:

$$P_{post} = \frac{V_1}{N_1} = \frac{N_0 \times P_{pre} + \Delta N \times P_{sub}}{N_0 + \Delta N}$$

Rights Issue

- Opportunity for existing shareholders to buy additional shares, newly issued shares at a discounted price
- Protects existing shareholders from dilution and capital losses
- Existing shareholders can sell their entitlement if issue if renounceable (tradeable)
- Often, separate timelines for institutional and retail investors

Example: (Rights issue)

Your firm has 50,000 shares outstanding at \$20 each. You need \$200,000 in fresh capital. You decide to issue a 4:1 right issue to buy one share @ \$16 for every 4 shares you already own. \$16 is called the subscription price. Compute the number of shares and relevant prices after issuance.

Solution:

One right per share, 4 rights (trading as a separate security) are necessary to subscribe to one new share.
 New share count: $50,000 \times \frac{4+1}{4} = 62,500$. Firm value as with SEO. Thus, new share price = \$19.20 as with SEO.

Value of one right is then $(\$19.20 - \$16)/4 = \$0.80$ as that is the benefit of buying a share worth \$19.2 for \$16 divided by the 4 rights required. This should be the fair price of one right.

Consequence for existing shareholders: You can sell the right instead of exercising it and cancel out the drop in price from \$20 to \$19.20. Fair to existing shareholders.

New investors need to buy 4 rights and then pay \$16 for a new share. No gain in theory.

Rights Issue Valuation

- Formally, the value of one right in an n:1 rights issue is:

$$P_{right} = \frac{(P_{pre} - P_{sub})}{n + 1}$$

- The new share price (often called the theoretical ex-rights price, or TERP) is:

$$P_{post} = \frac{n \times P_{pre} + 1 \times P_{sub}}{n + 1}$$

- Putting the 2 together, you can confirm that existing shareholders do not lose any value in the transaction:

$$P_{post} + P_{right} = \frac{n \times P_{pre} + 1 \times P_{sub}}{n + 1} + \frac{(P_{pre} - P_{sub})}{n + 1} = P_{pre}$$

Price Reaction to Raising Additional Equity

- Share prices tend to decline when new equity is issued.
- Possible explanations:
 - High issuance costs (underwriting fees)
 - Investors suspect bad use of funds: e.g. waste on bad acquisition
 - Signalling: Decision to use equity reveals negative information

Information Revealed by Capital Structure Decisions

- Market timing theory:** When managers sell new shares because they believe the shares are overvalued; managers would rely on debt and retained if they believed shares were undervalued.
- Pecking order theory** of capital raising: Use retained earnings first \Rightarrow then debt \Rightarrow then convertible issues \Rightarrow equity only as a last resort. Having to raise equity can be a bad signal!
- Signalling theory** of debt: The use of leverage rather than equity can signal good information to investors. Reason: Interest payments are a commitment and require discipline on spending.

Trade Credit

- A short term debt financing method
- A seller may extend trade credit to a buyer: payment sometime after goods delivery
- Company in the middle:
 - Buys inventory from suppliers
 - Does not pay right away
 - Holds inventory

- Sells products to customers
- May not get paid right away

Working Capital Management (WCM) & Cash Conversion Cycle

- **Big companies** have the power to:
 - Force suppliers to offer generous repayment terms
 - Hold just-in-time inventory
 - Enforce fast repayment from its customers
- **Small retailers** do not have the credit to get good terms from suppliers, lack inventory management and get paid late by customers
- Efficient WCM reduces capital needs. Some firms can dictate repayment terms on both sides. This provides a competitive advantage.

Trade Credit Terms

- Typical structure of trade credit terms:
 - Pay within the first T_1 days and receive a discount
 - Pay in full later than T_1 (but before T_2 to avoid receiving late fees)
- We abbreviate this as $(\frac{x}{T_1}, \text{net } T_2)$

Example: (Trade Credit)

A vendor is offering a (1/7, n/30) term to their customer. (Receive 1% discount in 7 days, otherwise full amount due in 30 days). Assume the customer is low on funds until the inventory is sold. They will optimally delay to the last possible day within each window. Two choices:

- Pay after 7 days and finance the invoice via 3rd party (bank)
- Pay after 30 days

What is the implied cost of the loan that the vendor is offering? Should the customer take it?

Solution:

- If the implied interest rate is higher than the 3rd party rate, borrow and pay vendor early
- If implied interest rate is lower, take the full term of vendor financing.

Matching Use and Source of Funds

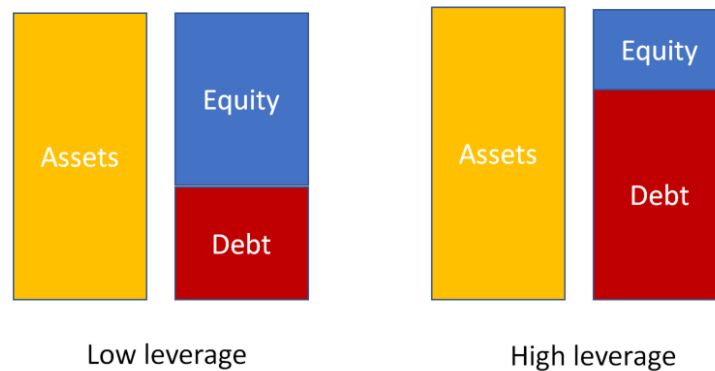
- **Matching principle** of capital raising: Companies should match the cash flow profile and horizon of the source of financing with the expected cash flow profile and horizon of the investment/asset.
 - Use short-term financing for short-term assets
 - Use long-term financing with the lifetime of the long-lived asset

Capital Structure and Financial Risk

Introduction to Capital Structure

- Capital structure refers to the composition of the liability side of the balance sheet of an organisation.
 - The relative proportions of different sources of financing for a firm
- A firm that is 100% equity is called 'unlevered'.

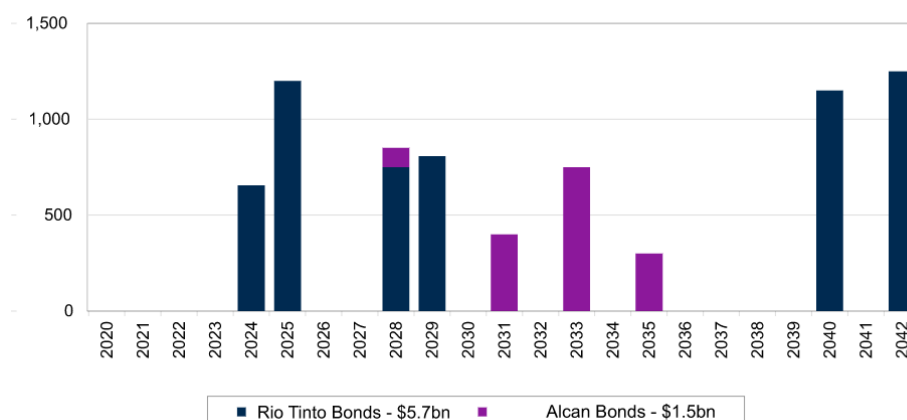
- A firm becomes levered in the presence of debt (financial leverage)



- Leverage ratios:
 - Debt to Equity Ratio (D/E)
 - Debt to Asset Ratio (D/A)
- $A = V = V_L = E + D$
 - Subscript L means 'levered'. Subscript U means 'unlevered'. We think of D as being net debt.
- Another way to express the capital structure is in percentage weights of total.
 - The D/A ratio is the relative proportion of firm financed by debt: $w_D = \frac{D}{A} = \frac{D}{E+D}$
 - Weight of equity: $w_E = \frac{E}{A} = \frac{E}{E+D}$
- These ratios are based on market values of debt and equity, not book value
- Leverage ratios will change when firms issue new securities to investors or redeem existing securities

Maturity Profile

- A key concern when it comes to debt is the management of the maturity dates of the various bank loans, credit facilities and bonds that a firm may have outstanding.
- This can be managed using a (debt) maturity profile:



- The goal is to ensure all debts are not due at the same time, and to regularly refinance portions to push maturities into the future.

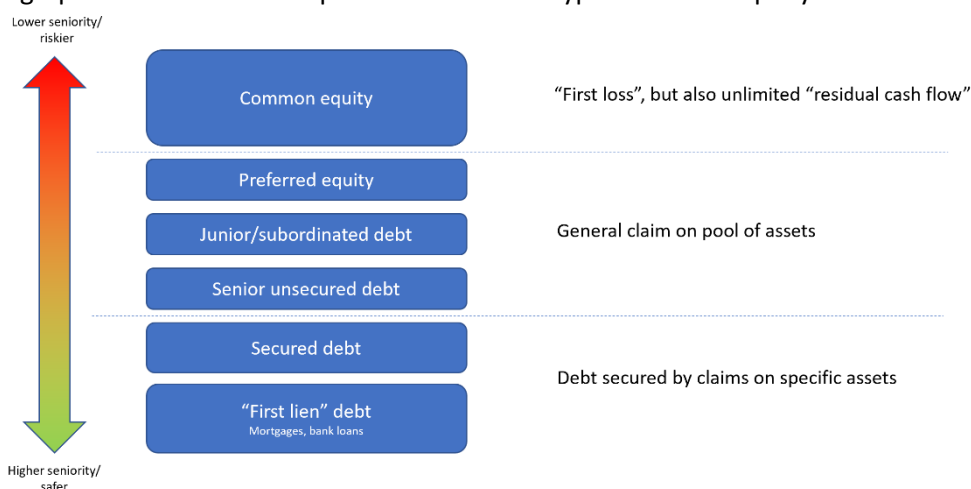
Financial Distress

- Downsides of debt financing:
 - Delays in payments will cause trouble with creditors
 - Might need to declare bankruptcy in the worst case
 - Creditors may also repossess certain assets of the borrower
- For a corporation, EBIT must be high enough to pay annual interest costs

- Firms with weak performance in the presence of debt can be in what is called financial distress.
- Leverage (based on market values) tends to be a very good proxy for financial distress.
- Performance-based measures such as interest coverage ratios provide an idea of the earnings power of the firm relative to its interest cost.
- Financial distress is not bankruptcy yet, but there is an elevated chance that continued poor performance will lead there.
- Well before bankruptcy, financial distress tends to have negative consequences for the organization. We will call these the indirect costs of financial distress:
 - creditors will be reluctant to provide fresh financing
 - cost of financing will increase
 - management will be distracted while dealing with anxious creditors
 - loss of customers
 - loss of supplies
 - loss of key employees
 - bad publicity

Seniority and Capital Structure

- The aspects of the capital structure that investors hold doesn't usually matter, but it can matter a lot when the company is in financial distress.
- There are many types of debt and a small number of types of equity (mostly common shares and preferred shares).
- Whenever new debt is issued the bond indenture describes its exact rank relative to all existing debt instruments and will often stipulate how it is to be treated relative to debt instruments to be issued in the future.
- The graph below ranks the capital structure of a hypothetical company in detail:



- In the case of bankruptcy, the assets in the firm get allocated according to this ranking
- The lower an instrument sits on the stack, the safer it is during financial stress.
- Shareholders will not receive anything in bankruptcy as debt holds priority.

Cost of Capital

- A key consideration in the mix of equity is the cost of each financing option (cost of capital)
- Capital comes from investors which expect an adequate return on their money given the risks they incur.
 - This expected return becomes a cost to the firm
- In this unit, all that matters is that a shareholders require a certain percentage in return (cost of equity) and debtholders require another percentage return (cost of debt)

Example: German car company Volkswagen has \$250B in debt outstanding (at market values) and its shares are currently worth \$170B. Assume its cost of debt is 2%, and it's cost of equity is 8%. What is the firm's total cost of capital (in the absence of taxation)?

Solution:

The firm's total value: $V = V_L = E + D = \$170B + \$250B = \$420B$

The firm's capital structure:

$$w_D = \frac{D}{E + D} = \frac{\$250B}{\$420B} = 59.5\%$$

$$w_E = \frac{E}{E + D} = \frac{\$170B}{\$420B} = 40.5\%$$

Suppose the company faces a (interest) cost of 2% per annum for 59.5% of its capital structure and of 8% per annum for the other 40.5%. The overall cost of capital is the average of these two, taking into account their relative sizes.

This is called the weighted average cost of capital, or short the **WACC**:

$$r_{WACC} = w_E \cdot r_E + w_D \cdot r_D = (0.405) \cdot (8\%) + (0.595) \cdot (2\%) = 4.43\%$$

Perpetuities

- Certain financial securities pay out the same dollar amount to their investors each year, and there is no end date.
- Incidentally, such a cash flow stream is called a perpetuity and there are some examples in the real world:
 - Preferred shares (U.S. version) pay a fixed dividend each year and may come without a maturity date.
 - Consol bonds are bonds that pay annual interest and also have no maturity date where the principal would be returned.
 - In theory, a company may not grow at all, have similar earnings each year and decide to pay the same dividend forever.
- Pricing a perpetuity:

$$V_0(\text{Perpetuity}) = \frac{CF}{r}$$

Leverage (No Taxes)

- Consider an all-equity firm in a world without taxes and financial distress. The cost of capital is $r_U = 10\%$ (subscript U for unlevered).
- This is also the required rate of return that the owner of the entire firm requires to buy and hold its assets.
- On average, it earns annual EBIT of \$600,000, year after year. In the absence of debt and taxation, this figure also represents its net income. Using the perpetuity assumption, its firm value is thus:

$$V_U = \frac{CF}{r_U} = \frac{\$600,000}{10\%} = \$6m$$

- As capital structure changes towards increasing levels of debt:
 - Firm value does not change
 - Overall risk of operations does not change, even if capital structure does. As such, risk of assets remains the same
 - Total cash flow produced by the business remains the same
 - What changes is how it is split between shareholders and debtholders

- Essentially: $V_L = V_U$
- While the risk for the firm as a whole does not change, the risk for shareholders changes a lot
- Computing cost of equity:

$$r_E = r_U + \frac{D}{E}(r_U - r_D)$$

Leverage (With Corporate Taxation)

Leverage and Cash Flows

Example: In 2021, Woolworths reported an EBIT of \$2.8b and interest cost of \$600m and was subject to a $T_c = 30\%$ tax rate. Compute the net income and potential cash flow to all investors.

Solution:

$$\text{Income}_{\text{before tax}} = \text{EBIT} - \text{Interest} = \$2.8b - \$0.6b = \$2.2b$$

$$\text{Net Income}_{\text{Levered}} = \text{Income}_{\text{before tax}} \times (1 - T_c) = \$2.2b(1 - 0.3) = \$1.54b$$

Thus, in total, WOW could potentially pay $\$1.54b + \$0.6b = \$2.14b$ to all investors.

Example: What would the net income have been if Woolworth's was all-equity financed?

Solution:

$$\text{Net Income}_{\text{Unlevered}} = \text{EBIT} \times (1 - T_c) = \$2.8b(1 - 0.3) = \$1.96b < \$2.14b$$

- Leverage increases total cash flow to investors because interest is a tax-deductible expense.
- Net income to the unlevered and levered firm:

$$\begin{aligned} NI_U &= \text{EBIT}(1 - T_c) \\ NI_L &= (\text{EBIT} - D \cdot r_D)(1 - T_c) \end{aligned}$$

- Total payments to investors from the levered firm:

$$\begin{aligned} NI_L + \text{Interest} &= (\text{EBIT} - D \cdot r_D)(1 - T_c) + D \cdot r_D \\ &= \text{EBIT}(1 - T_c) + \underbrace{D \cdot r_D \cdot T_c}_{\text{Interest tax shield}} = NI_U + ITS \end{aligned}$$

- The interest expense creates a so-called interest tax shield (ITS) leaving more cash flow to investors in total.

Leverage and Firm Value

- Previously, the unlevered firm was worth:

$$V_U = \frac{NI_U}{r_U} = \frac{\$420,000}{10\%} = \$4.2m$$

- In the presence of debt, the firm receives an annual benefit, the Interest Tax Shield (ITS):

$$ITS = r_D \cdot D \cdot T_c = 5\% \cdot \$2.1m \cdot 30\% = \$31,500$$

- Assuming perpetuity – Receive ITS every year:

$$\text{PV}(ITS) = \frac{r_D \cdot D \cdot T_c}{r_D} = D \cdot T_c = \$2.1m \cdot 30\% = \$0.63m$$

$$V_L = V_U + D \cdot T_c = \$4.2m + \$0.63m = \$4.83m > V_U$$

$$E = V_L - D = \$4.83m - \$2.1m = \$2.73m$$

Leverage and Cost of Equity

- Similar to the case without taxes, the risk to equity holders goes up with leverage:

$$r_E = r_U + \frac{D}{E}(1 - T_c)(r_U - r_D)$$
$$= 10\% + \frac{\$2.1m}{\$2.73m}(1 - 30\%)(10\% - 5\%) = 12.69\%$$

- Increase is less steep with taxes
- Intuition: ITS provides a risk-free benefit to equity, compensating for risk from leverage.

Leverage and Weighted Average Cost of Capital

Given the valuations, we can compute capital structure weights:

$$V_L = \$4.83m \quad D = \$2.1m \quad E = \$2.73m.$$
$$w_D = 0.4348 \text{ and } w_E = 0.5652.$$

Cost of debt is $r_D = 5\%$ and cost of levered equity is $r_E = 12.69\%$.

But managers prefer to see the tax advantage of debt reflected in their cost of capital. They prefer the **after-tax WACC**:

$$r_{WACC} = w_E r_E + w_D r_D (1 - T_c)$$
$$= (0.5652)(12.69\%) + (0.4348) \cdot (5\%)(1 - 0.3) = 9.35\% < 10\%$$

$$r_{WACC} < r_U$$

Firm value increases by the value of the permanent tax shield

$$V_L = V_U + PV(ITS) > V_U$$

... which benefits equity

$$E = V_L - D$$

... while the cost of equity increases (similar to case without taxes):

$$r_E = r_U + \frac{D}{E}(1 - T_c)(r_U - r_D)$$

... and after-tax WACC is reduced somewhat

$$r_{WACC} = w_E r_E + w_D r_D (1 - T_c)$$

Summary

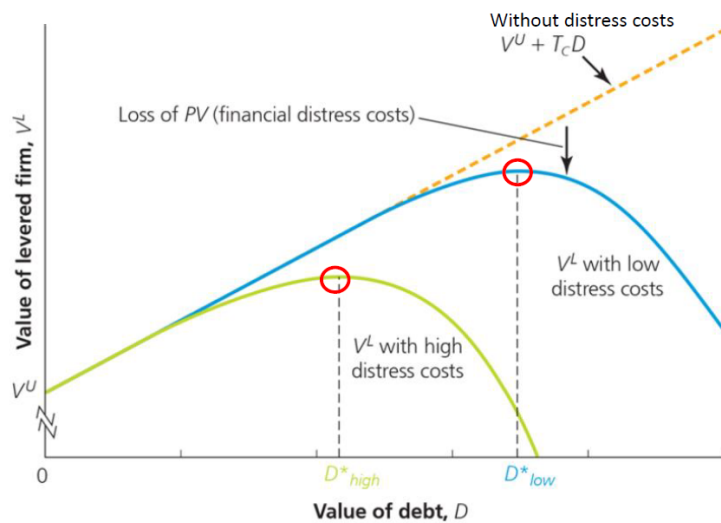
Optimal Capital Structure

The downsides of leverage

- Increasing leverage in the presence of taxes has advantages:
 - Interest tax shield increases firm value and shareholder value
 - Debt disciplines spending habits of managers
 - Debt may reflect positive insider information of management
- However,
 - Equity is the shock absorber for debt
 - Need to at least earn interest costs. Volatile earnings create default risk and increase cost of debt
 - Additional indirect and direct costs of financial distress

Optimal Structure

- A firm should borrow up to a point where the tax benefit from an extra dollar in debt is equal to the marginal cost that comes from the increased probability of financial stress



- At some point, the additional value of the interest tax shield will be offset by additional expected distress costs
- From then on, the value of the firm will start to decrease and the WACC will start to increase when more debt is added

Implicit Cost of Financial Distress

- Recall firm with $D = \$2.1m$ and $E = 2.73m$ (under taxation, without FD)
- Assume 50,000 shares outstanding and observed share price of \$45
- Theoretical share price* = $\$2.73m / 50,000 = \54.60
- Shareholders are not willing to pay that price
- Total present value of FD costs = $50,000 \times (\$54.60 - \$45) = \$480,000$

Stakeholder Conflicts during FD

- Agency problems between management/shareholders vs. debtholders
- In financial distress, debtholders want the firm to reduce risks to not endanger their principal. Instead:
 - Shareholders might prefer to 'gamble for resurrection' (e.g. invest in high risk, high potential payoff projects)
 - Conversely, low-risk projects with positive, but moderate profits do not help shareholders, thus there is a tendency to under invest during financial distress.

Types of Risk

Operational Risk

- The risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events.

Business Risk

- Business risk stems from the core operations of the firm.
- Two components:
 - Sales risk: uncertainty of revenue
 - Operating risk: Risk due to the cost structure of the business, especially its level of fixed cost

Operating and Financial Risk

- Both types of leverage amplify each other
- Operating and financial risks and substitutes. More of one means less capacity for the other
- Companies within and across industries face different cost structures
- Potential for competitive advantages