<table>
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<th>Concepts</th>
<th>Description</th>
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<tr>
<td>Capital budgeting process</td>
<td>Process of identifying and evaluating capital projects (projects where CF to firm will be received over a period longer than a year)</td>
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| Categories of capital budgeting projects     | 1. Replacement projects to maintain the business: - Requires detailed analysis - Issue: Should the existing operations continue; and should the existing processes be maintained  
2. Replacement projects for cost reduction: - Whether obsolete usable equipment should be replaced - Fairly detailed analysis is required  
3. Expansion projects: - To expand a business - Require explicit forecast of future demand → involve complex decision-making process  
4. New product / market development: - Complex decision-making process, with detailed analysis, due to high level of uncertainty  
5. Mandatory projects: - Required by govt. agency / insurance company - Involves safety-related / envi concerns - Generate minimum revenue, but accompany new revenue-generating projects undertaken by the company  
6. Other projects  

5 Principles of capital budgeting  
1. Decision based in CF, not accounting income - Sunk cost: Not included - Externality (effect of the project acceptance on firm’s other CF): Include  
2. CF are based on opportunities costs - Opportunities cost: Include  
3. Timing of CF is important  
4. CF analysed on after-tax basis  
5. Financing cost are reflected in project’s required rate of return  

Expansion project - Method to calculate yearly CF  
1. Initial investment outlay: upfront costs of the project  
   - Initial investment outlay = Initial cost investment (FCInv) + Net Working Capital investment (NWCInv)  
   - NWCInv must be included because additional inventories are required to generate additional sales; ↑ sales → ↑ AR; ↑ inventory → ↑ AP  
   - NWCInv = Cash assets - Current liabilities  
   - NWCInv > 0 → require additional financing → cash outflow to fund net investment in current assets (and vice versa)  
   - End of project to no need for additional WC → cash inflow (outflow) equal to initial NWC  

2. After-tax operating CF: Incremental CF over capital asset’s economic life  
   - CF = (S ‐ C ‐ D) × (1 ‐ T) + T × D  
   - S = Sales  
   - C = Cash operating costs  
   - D = Depreciation expense  
   - T = Marginal tax rate  
   - (*): Depreciation: non-cash operating expense, but reduce the taxes paid by firm  

3. Terminal year after-tax non-operating CF (TNOCF):  
   - Net Working Capital Return (NOCR)  
   - Ending balance = Initial balance + Incremental operating CF over capital asset’s economic life  
   - TNOCF = Sal + NWCInv + T × (SalInv – NWCInv)  
   - TNOCF = (Sal – B) + NWCInv + T × (SalInv – NWCInv)  
   - TNOCF = (Sal – B) + NWCInv + T × (SalInv – NWCInv)  
   - Sal – B = Book value  
   - TNOCF = (Sal – B) + NWCInv + T × (SalInv – NWCInv)  

Replacement project - Method to calculate yearly CF  
1. Initial outlay: reflect the sale of old asset  
   - Initial outlay = FCInv + NWCInv – SalInv + T × (SalInv – B)  

2. After-tax operating CF: calculate incremental operating CF  
   - ∆CF = (∆S – ∆C) × (1 ‐ T) + ∆D × T  

3. Terminal year after-tax non-operating CF (TNOCF):  
   - TNOCF = (SalNew – SalOld) + NWCInv – T × (SalInvNew – NWCInv) – (SalInvOld – NWCInv)  

Effect of inflation on capital budgeting analysis  
1. Analysing nominal / real CF: should match type of CF with the discount rate (Nominal CF: Nominal discount rate; Real CF: Real discount rate)  
2. Changes in inflation affect project profitability: inflation higher than expected → future CF → project’s value  
3. Inflation reduce tax saving from depreciation  
4. Inflation decrease the payment value to bondholders  
5. Inflation affect sales and cost differently: due to price of output goods change differently to prices of inputs → after-tax CF may be better or worse  

Mutually exclusive projects with different lives  
2 approaches:  
1. Least common multiple of lives approach  
2. Equivalent annual annuity (EAA) approach (compare annual payment)  

Capital rationing  
- Capital rationing: allocation of fixed amount of capital among a set of available projects → maximise shareholder wealth. Choose combination of projects it can afford to have the greatest total NPV  
- Hard capital rationing: fund allocated to managers cannot be increased  
- Soft capital rationing: allow to increase allocated capital budget if can justify that additional funds will create shareholder value  

Sensitivity analysis  
- Sensitivity analysis: changing an independent input variables to see the change in dependent variable  
   - Start with base case scenario  
   - Change 1 variable by a fixed % point above and below the base case  
   - Noting the effect of the change on the project NPV  

Scenario analysis  
- Scenario analysis: risk analysis technique, that consider both the sensitivity of key output variable (NPV) to changes in key input variables  
   - Allow for changes in multiple input variables at once  
   - Create Worst case, Best case and Base case
**Valuing a target company - Comparable transactions**

**Step 1:** Identify a set of takeover transactions - involve firms in same industry, similar capital structure as the target

**Step 2:** Calculate various relative value measures based on completed deal prices for sample transactions

**Step 3:** Calculate mean/median/range for chosen relative value measures; apply those measure to the target company

**Compare between DCF / Comparable company / Comparable transaction analysis**

<table>
<thead>
<tr>
<th>Advantages</th>
<th>DCF</th>
<th>Comparable company</th>
<th>Comparable transaction</th>
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<tbody>
<tr>
<td>- Easy to model any changes in target's CF due to synergy or change in cost structure</td>
<td>- Data of comparable companies is easy to access</td>
<td>- No need to estimate separate takeover premium</td>
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<tr>
<td>- Estimate of company value based on forecast of future fundamental condition rather than current data</td>
<td>- Assumption that similar assets have similar values is fundamentally sound</td>
<td>- Derived directly from recent completed deals, rather than assumptions/estimates about the future</td>
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<tr>
<td>- Easy to customise</td>
<td>- Estimates of synergy are directly from the market, rather than assumptions/estimates about the future</td>
<td>- Reduce the risk of lawsuit from target's shareholders against target's managers and BOD for mispricing the deal</td>
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<td>- Difficult to apply when CF are negative</td>
<td>- Only provide estimate of fair stock price. Takeover price must be determined separately</td>
<td>- Assume value of past transactions is accurate. If past transactions are overpriced / underpriced → carry over to the estimated value of the target</td>
<td></td>
</tr>
<tr>
<td>- Estimates of CF and earnings are highly subject to error</td>
<td>- Hard to take into account the effect of synergy or change in capital structure</td>
<td>- May not be enough of comparable transactions to develop a reliable set of data to calculate the estimated target value</td>
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<tr>
<td>- Discount rate changes over time, and have large impact on valuation estimate</td>
<td>- Historical data used to estimate takeover premium may not be timely → not reflect current condition in M&amp;A market</td>
<td>- Hard to take into account the effect of synergy or change in capital structure</td>
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**Post merger value of acquirer**

\[ V_{nt+1} = V_{t} + V_{t} + \text{Synergy} - \text{Cash paid to target} \]

In which:

- \( V_{nt+1} \) = post merger value of combined company (Acquirer + Target)
- \( V_{t} \) = Pre merger value of acquirer
- \( V_{t} \) = Pre merger value of target

**Gain of the Target**

\[ \text{Gain}_{a} = \text{Takeover premium} = P_{t} - V_{t} \]

In which:

- \( P_{t} \) = Price paid to target
- \( V_{t} \) = Value of target

**Gain of the Acquirer**

\[ \text{Gain}_{a} = \text{Synergy} - \text{Takeover premium} = \text{Synergy} - (P_{t} - V_{t}) \]

**Cash Payment vs. Stock payment**

1. Cash offer: profit of target's shareholders is capped @ takeover premium
2. Stock offer: Profit of target's shareholders is determined by value of combined firm's stock

\[ P_{t} = \frac{N \times \text{PPS}_{n+1}}{N_{a} + N_{t}} \]

In which:

- \( P_{t} \) = Price paid to target
- \( N_{a} \) = number of shares of the target receives
- \( N_{t} \) = number of shares of the parent receives

**Post merger studies**

1. Performance studies:
   - Targets gain = 30%
   - Acquirer losses = 1% - 3%
   - Reason 1: High premium received by Target, due to Acquirer suffer from Winner's curse
   - Reason 2: Managerial hubris - overestimate the synergy and expected benefits of the merger
2. Longer term performance studies:
   - Acquirer led to underperform their peers
   - Avg. return of acquirer 3 years after a merger = -4%
   - Over 60% acquirer lagging their peer group
   - Reason: due to failure to capture promised synergies

**Characteristics of M&A transactions that create value**

1. Strong buyer: Acquirer shows strong performance (i.e.: earnings; stock price growth) in the prior 4 years
2. Low takeover premium
3. Few bidders → Greater acquirer's future returns
4. Favorable market reaction

**Diversities / Equity carve-out / Spin-offs / Liquidations**

1. Diversites: A company selling / liquidating / spinning off a division or subsidiary, mostly to outside buyer
2. Equity carve-out: Create a new, independent legal, with separate management team, by giving an equity interest in a sub to outside shareholders (issued in a public offering)
3. Spin-offs: Create a new, independent legal, with separate management team, by distributing sub's shares to the parent's shareholders proportionately → Same shareholders with the Parent company
4. Split-offs: Allow shareholders to receive a new shares of a division of the Parent, in exchange for a portion of their shares in the parent company
5. Liquidations: Break up the firm and sell its assets separately. Mostly associated with bankruptcy

**Common reasons for restructuring**

1. Division no longer fits into management's LT strategy - unable to make profit / no fit with the LT direction of the company
2. Lack of profitability: Division's return < Firm's cost of capital
3. Individual parts are worth more than the whole (reverse synergy)
4. Infusion of cash: Parent company experiences financing difficulty → selling a division to raise cash and reduce debt