# Corporate Finance - Demo 4

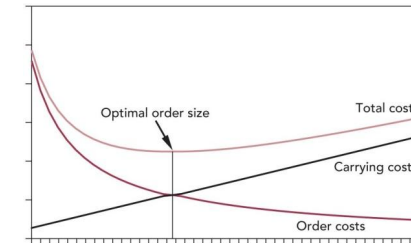## Working Capital Management & Mergers

Aalto University School of Business

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# Review: Working Capital Management

1. **Working Capital:** Net Working Capital, Operating and Cash Cycles

2. **Working Capital Management - Current Assets**

   a) **Inventory management:** $EOQ^* = \sqrt{\dfrac{2 \times Sales \times Cost\ Per\ Order}{Carrying\ Cost\ Per\ Unit}}$ $\Longleftrightarrow$

   

   b) **Credit management (Accounts receivable):** 5 steps

   - Terms of Sale (e.g., cash discount "2/10, net 30")
   - Contract form (e.g., open account)
   - Credit risk analysis (e.g, credit agencies or bureaus)
   - Credit decision (expected profits-binomial trees, 3 general principles)

     - non-repeat orders: $E[\Pr ofit] = p \times PV_{(Revenue- Cost)} - (1- p) \times PV_{Cost}$

     - repeat orders: $E[\Pr ofit] = E[P\,rofit_{Initial\,Order}] + p_{payment\&repeatorder} \times PV(E[P\,rofit_{NextYear\,Re\,peat\,Order}])$

       $E[P\,rofit_{Initial\,Order}] = p_1 \times PV_{(Revenue- Cost)} - (1- p_1) \times PV_{Cost}$

       $E[P\,rofit_{NextYear\,Re\,peat\,Order}] = p_2 \times PV_{(Revenue- Cost)} - (1- p_2) \times PV_{Cost}$

   - Collection policy (e.g., factoring) $Q^* = \sqrt{\dfrac{2 \times Amount\ Needed \times Cost\ Per\ Transaction}{Opportunity\ Cost\ of\ Captial}}$

   d) **Cash management** (liquidity vs. forgone interest)

   e) **Marketable Securities:** Money market

3. **Working Capital Management - Current Liabilities**

   a) **Short-term borrowing:** sources (bank loans, commercial paper etc.)

   b) **Accounts payable**

*Chapter 30*

# Problem 1: True/False

"A decrease in interest rates will increase the optimal cash holding of a company."

# Problem 1: True/False

**True**

*A decrease in interest rates will decrease the cost of holding non-interest bearing cash, and thus lead to an increase in optimal cash balance.*

# Problem 2: Cash Management

Decode Corporation is a biotech start-up. The company has just raised new funds from a venture capitalist in order to finance the development of a new biotech product. Decode has no sales or other sources of revenue and currently holds its funds in marketable securities that have an annual return of 5 %. Decode knows for certain that it will need €300,000 in cash every month to finance its R&D work. The R&D costs will occur evenly throughout the month, so there are no fluctuations in cash needs. The cost of selling the company's marketable securities is estimated to be €33.00 per each transaction. Assume that the company earns no interest on the cash it holds.

# Problem 2: Cash Management

a) How often should the company sell its securities to finance the R&D work?

*The problem can be solved with the EOQ formula.*

*M = total money needed annually       c = fixed (transaction) cost*

*r = opportunity cost of capital          Q\* = optimal amount of securities*

$$Q^* = \sqrt{\frac{2 \times M \times c}{r}} = \sqrt{\frac{2 \times (12 \times 300,000) \times 33}{0.05}} = €68,934.75$$

Þ Number of order times per month $= \dfrac{€300,000}{€68,934.75} = 4.35$

*The securities have to be sold 4.35 times a month or about once a week.*

# Problem 2: Cash Management

b) How does your answer to part (a) change if the company must have at least €10,000 in cash at all times?

*There is no change as the EOQ remains the same. The only difference is that the company should only sell securities after the cash balance reaches €10,000 and maintain the cash balance above €10,000.*

# Problem 3: Credit Management

Aeron Inc. is a wholesale distributor of aircraft engines. A new customer has placed an order for 8 turbine engines. The cost of the engines for Aeron is €1.7 million per engine (in cash), and it offers to sell the engines at a credit price of €1.8 million per engine. Aeron has to pay for the engines immediately after it has agreed to sell them. If Aeron grants the credit, the customer must pay for the engines in one year. Based on historical experience, payment for 1 out of 60 of similar orders is never collected. Aeron's required return for the credit period of one year is 5 %.

# Problem 3: Credit Management

a) Assume that this is a one-time order and that the customer will not accept the offer if she cannot pay with credit. Should Aeron grant the credit?

*Calculate the NPV of the credit extension:*

$$NPV_{credit} = PV(E[\text{Revenue}]) - \text{Cost of Engines}$$

$$= \frac{(\frac{1}{60} \times 0) + (\frac{59}{60} \times €1.8m \times 8)}{1 + 0.05} - €1.7m \times 8 = -€114,000 < 0$$

è *Credit should not be granted!*

# Problem 3: Credit Management

a) What is the break-even probability of default?

*Break-even probability of default:*

$$NPV_{credit} = \frac{p \times €1.8m \times 8 + (1-p) \times 0}{1+0.05} - €1.7m \times 8 = 0$$

Þ  $p = 0.9917$

Þ  $1 - p = 0.0083$

*Given probability of default 1/60 = 0.0167*

# Problem 3: Credit Management

b) Suppose that customers who do not default on their first payment become repeat customers and place the same order every year into perpetuity. Further assume that repeat customers never default. Should Aeron grant the credit?

*Draw the timeline, you will see cash flows to Aeron are as follows:*

- *At t=0: Aeron purchases the engines & pays 8x€1.7m immediately*

- *At t=1, 2, … : Aeron receives 8x€1.8m for the previous order and pays 8x€1.7m for the next order with 59/60 probability*

$$NPV_{credit} = \sum_{t=1}^{\infty} \left[ PV(E(\text{Collections - Costs})_t) \right] - \text{Cost of Initial Order}$$

$$= \left[ \frac{59}{60} \left( \frac{\left[ (€1.8m - €1.7m) \times 8 \right]}{0.05} \right) + \frac{1}{60} \times 0 \right] - €1.7m \times 8 = €2,130,000 > 0$$

➔ *Credit should be granted!*

b) What is the break-even probability of default? (Here break-even probability of default refers to default on the first payment, since once customers become repeat customers, they never default.)

*Break-even probability of default:*

$$NPV_{credit} = \frac{p \times \left[ (€1.8m - €1.7m) \times 8 \right]}{0.05} - €1.7m \times 8 = 0$$

$$\Rightarrow \quad 1 - p = 0.15$$

# Review: Mergers & Acquisitions

## 1. Preliminaries

- Definitions (Mergers, acquisitions, tender offers)

- Categories:

  - horizontal, vertical, conglomerate ones;

  - hostile, friendly ones;

  - strategic, financial ones

- Theories

  - Merger theories

  - Dubious reasons

## 2. Evaluation of M&As

a) **Gain from merger:** $Gain = PV_{AB} - (PV_A + PV_B) = \Delta PV_{AB}$

b) **Cost to acquirer:** $Cost_{A\ (Cash)} = CashPaid - PV_B (= NPV_B)$

- Payment with cash:

  - costs unaffected by gains

  - positive price reaction for the acquired company

- Payment with stock: $Cost_{A\ (Stock)} = N_B \times P_{AB} - PV_B = x_B \times PV_{AB} - PV_B (= NPV_B)$

  - costs depend on gains

  - negative price reaction for the acquiring company

c) **NPV of a merger or acquisition:** $NPV_A = Gain - Cost_A$

# Problem 4: Mergers &Acquisitions

Centro Corporation is considering whether to acquire Dynamic Enterprises. The CFO has collected the following information:

|                        | Centro      | Dynamic   |
|------------------------|-------------|-----------|
| Price to earnings ratio | 22          | 15        |
| Shares outstanding      | 2,500,000   | 180,000   |
| Earnings                | €2,000,000  | €600,000  |

Centro also knows that securities analysts expect the earnings and dividends of Dynamic (which has just paid out an annual dividend of €2.25 per share) to grow at a constant rate of 5% per year. Centro's management believes that the acquisition of Dynamic will provide synergies that will increase Dynamic's growth rate to 7% per year. Assume that capital markets are perfect and that the acquisition does not alter the stand alone riskiness of either firm. Also assume that the value of Centro as a stand alone entity is unaffected by the acquisition.

# Problem 4: Mergers &Acquisitions

a) What is the value of Dynamic to Centro?

*Dynamic's stand-alone growth= 5% & growth as part of Centro= 7%*

*First, calculate the stand-alone value of Dynamic's stock and the corresponding required return:*

$$V_{D\_alone} = P \acute{} N = \frac{P}{EPS} \acute{} (EPS \acute{} N) = 15 \acute{} €600{,}000 = €9m$$

$$V_{D\_alone} = P \acute{} N = (\frac{Div_{1\_alone}}{r - g_{alone}}) \acute{} N = \frac{€2.25 \acute{} (1+5\%) \acute{}}{r - 5\%} 180{,}000$$

$$\Rightarrow r = 9.725\%$$

# Problem 4: Mergers &Acquisitions

a) What is the value of Dynamic to Centro?

*Now, calculate Dynamic's value with Centro (i.e., when $g_{after}$=7%):*

$$V_{D\_after} = P \times N = (\frac{Div_{1\_after}}{r - g_{after}}) \times N$$

$$= (\frac{€2.25 \times (1 + 7\%)}{9.725\% - 7\%}) \times 180,000$$

$$= €15.9m$$

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# Problem 4: Mergers &Acquisitions

b) How valuable are the synergy benefits?

*Since the value of Centro stays the same after the acquisition as its stand-alone value, the synergies are just made of the increase of the value of Dynamic:*

$$Gain = V_{D\_after} - V_{D\_alone} = €15.9m - €9m = €6.9m$$

# Problem 4: Mergers &Acquisitions

c)  What is the highest bid per share for Dynamic that would
    be acceptable to Centro's management?

$$\frac{V_{D\_after}}{N} = \frac{15.9m}{180,000} = \text{€}88.33$$

*€88.33 is the highest offerable bid, because costs exceed the
gains at higher bids.*

# Problem 5: Mergers &Acquisitions

Now, suppose Centro Corporation offers €70 in cash for each share of Dynamic.

a) What is the NPV of the acquisition to Centro?

Cash offered = €70 x 180,000= €12.6m

$$NPV_C = Gain - Cost_C = €6.9m - (€12.6m - €9m) = €3.3m$$

# Problem 5: Mergers &Acquisitions

b) What is the NPV to Dynamic's shareholders?

*Centro's cost is Dynamic's gain:*

$$NPV_D = Cash\_Offered - PV_{D\_alone}$$

$$= €12.6 - €9m = €3.6m$$

*Dynamic's shareholders get a higher portion of the total gain of the merger!*

# Problem 5: Mergers &Acquisitions

c) If Centro were to offer 3 new Centro shares in exchange for each Dynamic share (instead of the €70 cash offer), what would the NPV of the acquisition be to Centro? How much would Dynamic's shareholders gain per share?

*Centro's shareholders receive a company worth €15.9m, and in exchange give 3x180,000 = 540,000 shares to Dynamic's shareholders.*

*The value of the merged company:*

$$V_{CD} = V_C + V_{D\_after} = (\frac{P}{EPS})_C \times (EPS \times N)_C + €15.9m$$

$$= 22 \times €2m + €15.9m$$

$$= €59.9m$$

# Problem 5: Mergers &Acquisitions

c) NPV of the acquisition to Centro? How much would Dynamic's shareholders gain per share?

*NPV of the acquisition to Centro:*

$$NPV_C = €6.9m - (\frac{540,000}{2,500,000 + 540,000} \times €59.9m - €9m) = \underline{\underline{€5.26m}}$$

*Dynamic's shareholders' NPV:*

$$NPV_D = \frac{540,000}{2,500,000 + 540,000} \times €59.9m - €9m = \underline{\underline{€1.64m}}$$

*Dynamic's shareholders' gain per share:*

$$= \frac{€1.64m}{180,000} = \underline{\underline{€9.11}}$$

# Problem 6: Merger of Wineries

Chateau Local and Ruth's Vineyard, two wineries located in different continents, have decided to merge and form CLRV Wines. The two firms are identical except for their location. Their company value is determined entirely by the weather conditions of the upcoming year, as shown below:

| State (for the whole year) | Probability | Company value |
|---|---|---|
| Dry | 0.2 | €20 million |
| Temperate | 0.4 | €50 million |
| Wet | 0.4 | €40 million |

# Problem 6: Merger of Wineries

The weather conditions in each location are independent of each other. Both companies have one outstanding bond claim of €30 million to be paid at the end of the year. A drop in company value below this figure would lead to bankruptcy. Once the bond claim has been paid, the remaining company value belongs to equity holders. Assume that all investors, including bondholders, are risk neutral (they only want to maximize their expected payoff) and have a zero discount rate. It is currently the beginning of the year, and the merger is to be announced and completed the next day.

# Problem 6: Merger of Wineries

a) What is the combined market value of the two companies' debt before the merger announcement?

*For both companies, stand-alone payoffs are as follows:*

| State | Probability | Company value | Debtholder | Equity Holder |
|---|---|---|---|---|
| Dry | 0.2 | €20 m | 20m | 0 |
| Temperate | 0.4 | €50 m | 30m | 20m |
| Wet | 0.4 | €40 m | 30m | 10m |

*Bondholders don't get fully paid only in the dry state (with p=0.2).*

- *The company goes bankrupt and bondholders get €20m with 20% probability.*

*So, pre-merger value of each company's debt is:*

$$V_{D\_alone} = 0.2 \times €20m + (1-0.2) \times €30m = €28m$$

è *Total value of two companies' debt is 2x€28m = €56m!*

# Problem 6: Merger of Wineries

## b) What is the same value after the merger announcement?

*The payoffs for the merged firm (CLRV) are as follows:*

| State | Probability | Company value | Debtholder | Equity Holder |
|-------|-------------|---------------|------------|---------------|
| DD | 0.2x0.2 | €40 m | 40m | 0m |
| DT | 0.2x0.4 | €70 m | 60m | 10m |
| DW | 0.2x0.4 | €60 m | 60m | 0m |
| TD | 0.4x0.2 | €70 m | 60m | 10m |
| TT | 0.4x0.4 | €100 m | 60m | 40m |
| TW | 0.4x0.4 | €90 m | 60m | 30m |
| WD | 0.4x0.2 | €60 m | 60m | 0m |
| WT | 0.4x0.4 | €90 m | 60m | 30m |
| WW | 0.4x0.4 | €80 m | 60m | 20m |

*Total debt of the merged firm is €60m, which will be fully repaid unless both wineries simultaneously experience a dry season ($V_{CLRV}$=€40m < €60m) but the probability of this happening is only 4%!*

*Thus, market value of the CLRV's debt is now:*

$$0.04 \times \text{€}40m + (1 - 0.04) \times \text{€}60m = \underline{\underline{\text{€}59.2m}}$$

# Problem 6: Merger of Wineries

c) Suppose that the merger plan is announced and that the shares of the new company will be divided on equal basis among the shareholders of the old companies. Calculate the expected announcement effect (percentage change) on both companies' share price. Assume that capital markets are perfect and that the merger creates no synergy benefits that affect the company value.

*Total firm value before:* $V_{CL} + V_{RV} = 2 \times (0.2 \times 20 + 0.4 \times 50 + 0.4 \times 40) = €80m$

*Total equity value (E = V − D) before:* $E_{CL} + E_{RV} = €80m - €56m = €24m$

*Firm value after merger (no synergies):* $V_{CLRV} = €80m$

*Equity value (E = V − D) after:* $E_{CLRV} = V_{CLRV} - D_{CLRV} = €80m - €59.2m = €20.8m$

*As soon as the announcement is made, $E_{CL}$ and $E_{RV}$ will each drop from €12m to €10.4m.*

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# Problem 6: Merger of Wineries

c) Suppose that the merger plan is announced and that the shares of the new company will be divided on equal basis among the shareholders of the old companies. Calculate the expected announcement effect (percentage change) on both companies' share price. Assume that capital markets are perfect and that the merger creates no synergy benefits that affect the company value.

è *Percentage change in* $E_{CL \ (or \ RV)} = (€10.4m - €12m)/€12m - 1 = -13.3\%$