Andreas Krause

Investment decisions by companies

- Comparing the price of a stock with its value allows investors to make investment decisions; if the price is below its value the stock should be bought and if the price is above its value the stock should be sold.
- We can now use the same idea and principle to assess investment decisions companies make.

Present value of investments

Present value of investments

→ Similar to determining the value of stocks, we can determine the value of investment companies make by using the present value of any future profits.

- When deciding on making investments, companies also have to decide how this investment is to be financed, through equity or by obtaining a loan, thus debt. We will take this decision as given in the analysis here as the determination of the optimal way to finance investments is a topic in corporate finance that falls under capital structure decisions. We will have to take this mix of financing into account.
- The valuation of the investment would be determined by the future earnings the company obtains, this would be any future profits the investment generates to the company.
- We would take the these future profits and determine their present value over the full length of the investment, lasting T time periods. The discount rate R for these future profits is yet to be determined and will include a consideration of the amount of debt and equity the investment is financed with.
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→ We can now take this value of the investment and use it to determine whether it should be taken or not.

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- Thus, if the value of the investment, the present value of future profits, is larger than the initial investment, then the investment should be undertaken.
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  - The difference between the value of the investment and the initial investment is called the Net Present Value. This NPV gives the profits the company would make when pursuing the investment, it is the value added of the investment.
  - If this value added is positive, the investment is profitable and it should be pursued.

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$\Rightarrow$ $R = \mu \frac{E}{D+E} + r_L \frac{D}{D+E}$

- This is known as the Weighted Average Cost of Capital (WACC)

Cost of capital

→ We can now investigate how the way investment are financed influence the discount rate that is applied to the future profits.

- The investment is financed by a combination of debt and equity, and we need to apply a single discount rate to the entire profits. We will therefore have to take into account the way the investment is financed in determining an appropriate discount rate.
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  - We know that when using equity, the return that is required can be determined by asset pricing models. If the investment generates a higher return than implied by the asset pricing model the investment adds value to the company. That is because it generates more profits than is required to meet the demands of investors, the excess return generates economic profits.
  - The expected return based on asset pricing models is called the cost of equity. If a return larger than this cost of equity is generated, the investment is profitable; if a return lower than this cost of equity is generated, the investment is not profitable.
- If the investment is financed by debt, then the loan rate are the costs that the investment needs to cover at least to be considered profitable. The loan rate is also known as the cost of debt.
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  - *Formula*
  - The costs a company has, is now the return it requires on the equity it uses in the investment, multiplied by the equity, this gives the total costs arising from using equity. The total costs of the debt will be the interest that needs to be paid to the lender. These two element give the total costs the bank has. In order to break even, the profits generated by the investment must be this big. This would give us the rate of return that is required to make the bank cover its costs. This return would be the discount rate for the future investment profits. For stock valuation, the future profits are discounted by the expected returns; these expected returns were determined such that they compensated investors for the risks they were taking, according to the asset pricing model; thus at this return investors would be indifferent between investing and not investing into the stock. The same principle is applied here, if the investments breaks even, the profits of the investment are equal to the costs of financing the investment, the company is indifferent between investing and not investing. Thus we use this return as the discount rate.
- [⇒] We can solve the above equation for this return and noting that the investment consists of debt and equity.
- The Weighted Average Cost of Capital is, as the name suggests, the weighted average between the costs of equity (the expected rate of return from asset pricing models) and the cost of debt (the loan rate). The weights are the fraction of equity and debt, respectively, that are used in financing the investment.

→ We have now all components to determine the Net Present Value (NPV) of an investment and make the decision whether the investment should be pursued or not. We use the WACC to discount any future profits from the investment and compare this with the initial investment; if it is larger then the investment should be made and if it is smaller then it should not be taken.

Cost of capital

- The discount rate applied will depend on the financing of the investment with debt and equity: $I = D + E$
- Using equity will require a return as determined by asset pricing models, this is referred to as the cost of equity
- The costs of debt is given by the loan rate
- $RI = \mu E + r_L D$, representing the financing costs of the investment

$\Rightarrow$ $R = \mu \frac{E}{D+E} + r_L \frac{D}{D+E}$

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Limited resources

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→ While we have established that those investment exhibiting a positive NPV should be taken, it might not always be possible to pursue all such investments, for example if resources, whether financial or human, are limited. We will investigate how to proceed in these cases.

- Typically the amount of capital that is available for investments will be limited.
  - The amount of equity that can be raised in capital markets and the amount of loans available from banks or the issue of bonds, will also be limited.
- If many investments are available that have positive NPV, these resources might not be sufficient to pursue all possible investment; therefore companies need to choose which of the profitable investments they have available should be taken.
- The NPV is the economic profit an investment generates, thus it would be the amount by which the value of a company increases. Companies would seek to maximize the NPV by choosing those investments that jointly generate the highest NPV.
- It might be optimal to choose a large number of small investments, each generating a small NPV, but the large number of investments might make the overall NPV large.
  - This might be more profitable than making into a small number of large investments, even if these have a relatively large NPV.

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Impact on stock prices

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→ We can now briefly address the impact investments of on the value of stocks.

- The NPV represents the economic profits, that is the amount the company generates that is in excess of the costs of pursuing the investment. It is similar to the company making larger profits and as the NPV is the taking into account any costs of financing the investment and all such future profits are combined in the present value, it represents an increase in the value of the company.
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  - Although financed by debt and equity, the net benefits accrue only to shareholds/equity owners
  - Debt holders are already paid through the loan rate and these are deducted from, any earnings the company makes to obtain their profits.
- [⇒] This NPV from the investment should increase the value of the company, and hence the stock price in an efficient market, by the NPV of the investment(s) pursued.

→ Pursuing an investment with positive NPV would increase the stock value by this amount instantly.

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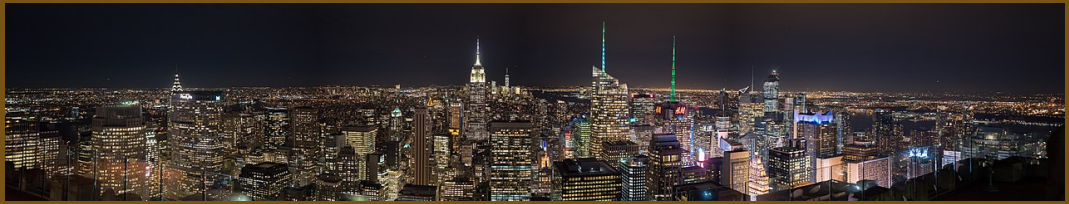

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