Financial and Cash Flow Analysis Methods

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Financial analysis

- *Historic analysis* (BS, ratios, CF analysis, management strategy)
- *Current position* (environment, industry, products, management)
- *Future* (competitiveness, forecasts, *future cash flows*)

Historic analysis - Financial statements

- P&L or income statement: Net Operating Profit (NOP, Gross returns - tot operating expenses), Profit before Tax, Net Profit after Tax (NPAT).
- BS: shows the book value of assets and liabilities of a company at year end. Current assets (convertible into cash within a year), fixed assets (land and buildings, plant and machinery...)

Historic analysis - ratios

Ratios - backward looking (but can also be forward looking), they vary for different industries:

- Return on sales % = NPAT / Sales (amounts)
- Asset turnover = Sales (amounts) / tot Assets
- Asset/equity ratio = tot Assets / Equity

Asset/equity ratio indicates a company's leverage, the amount of debt used to finance the firm. A company's asset/ equity ratio depends on the industry in which it operates, its size, economic conditions and other factors.

NB: by multiplying the above 3 ratios we obtain the return on equity %: NPAT / Equity

Other important ratios are:

- Debt-Service Coverage Ratio - DSCR: amount of cash flow available to meet annual interest and principal payments on debt:

Net operating income/ Total Debt Service

- A DSCR of less than 1 would mean a negative cash flow. A DSCR of 0.90, means that there is only enough net operating income to cover 90% of annual debt payments
- Liquidity ratios: it expresses a company's ability to repay short-term debt obligations

Historic analysis - CF analysis

Starting cash balance

\+ Cash generated from operations and other sources (i.e.investments)

\- Cash used to fund operations, investments (passive interest rates), research

= Ending cash balance

Future Cash Flow Analysis - Appraisal Methods

Aim of project appraisal: Select best projects for investment in order to:

- Provide adequate return to investors
- Maximise value of business to owners (shareholders)

Projects may involve:

- Large sums of expenditure
- Benefits accruing over a long period

Steps in Project Planning

(1) Identification of Opportunities, e.g. design of a new product.

(2) Identification of Alternatives, e.g. expansion in Ireland or Scotland.

(3) Obtaining data, e.g. costs, revenue, equipment.

(4) Evaluation of Options

(5) Choice & Planning

Appraisal Methods

(A) Accounting Rate of Return

(B) Payback Method

(C) Net Present Value (NPV)

(D) Internal Rate of Return (IRR)

(E) Profitability Index

Versions of ARR Method

(1) ARR = average annual profits /average annual investment

(2) ARR = total profits / initial investment

(3) ARR = average annual profits / initial investment

Drawbacks of the ARR Method

- Ignores *timing* of costs and revenues during project life.
- Does not identify *payback* period.
- Variety of *versions*, making comparison difficult.

Payback Method

- Period required to *recover* initial cash outflow (depreciation not considered).
- Annual net cash flow needs to be estimated.
- Aim to select investments that recover expenses in *shortest* possible time.
- *Discounted* payback is a refinement on the simple payback

  Management may set a payback *target*, within an overall process

Payback, example

- Payback:
- This can be illustrated by calculating the cumulative cash flows, as follows:
- Year C.F. Cumulative C.F
- 1 10,000 10,000
- 2 15,000 25,000
- 3 20,000 45,000
- 4 25,000 70,000
- 5 30,000 100,000
- original cost of investment £80000
- Project (A) = 4 years & 4 months.
- As the payback will occur within yr. 4, we need 10,000 ÷ 30,000 = 0.33 of yr. 4, i.e. 4 months. Hence, the PBP is 4 yrs. and 4 months, on the assumption that cash flow is uniform during the year.

Drawbacks of payback method

- Ignores *timing* of benefits (unless the discounted model is used)
- Ignores *differences* of project life, expenses and revenues *after* recovery of investment.

Discounted Cash Flow

- Techniques consider *timing* of revenues and expenses
- Total *profitability* of the project is looked at
- Techniques *superior* to ARR and Payback
- Looks at *cash flows* not accounting profits

NPV Method

$$\text{NPV} = \text{- Initial Investment} + \sum_{t=1}^{T=endofproj} \frac{CF_t}{(1+r)^t}$$

where:

CF_t: Net Cash flows (positive CF - expenses) at time t

T: end of project

r: discount rate which needs to take into account the level of risk of project

NPV Method

- Inflows and outflows are *discounted* using a target rate of return to find the *net present value*
- If NPV *positive*: return in excess of target rate
- If NPV *negative:* return less than target rate
- If NPV is *zero:* return is equal to target rate

Internal Rate of Return

- Determine discount rate that *makes* NPV=0
- Often referred to as the *DCF yield* of project
- If yield is *higher* than target→ project is viable and should be undertaken
- Uses *interpolation* to find *final* rate
- **Note:** the two rates between which we interpolate must not be distant from each other, a large difference will distort the final result. Also, one of these two rates needs to give a positive NPV, while the other leads to a negative NPV. This might require experimenting with several rates.

IRR Interpolation

$$IRR = R_1 + \left[\frac{(R_2 - R_1) * NPV_1}{(NPV_1 - NPV_2)}\right]$$

where:

R_1 = first estimate of IRR giving NPV_1

R_2 = second estimate of IRR giving NPV_2

if NPV_1 was >0, R_2 should be $> R_1$, if NPV_1 was <0, R_2 should be $< R_1$.

Profitability Index

$$PI = \frac{\text{PV of Future Cash Flows}}{\text{Initial Outlay}}$$

Index gives PV of net profit per £1 of capital investment.

Risk

- Risk occurs when there are several possible future outcomes, the probabilities of which can be quantified on some reasonable basis.
- Risk tends to increase as the life of the project increases, due to difficulties in looking into the far future.
- Techniques have been developed for decision-making in situations of risk

Probability and Expected Values

- It may be possible to make *alternative* predictions (e.g. sales revenues associated with different states of the economy), and assign degrees of probability to them, *scenario analysis*.
- It is possible to calculate the *expected NPV and IRR*, through multiplying the gain/loss of each alternative by the respective probability, and then adding the products.
- Both the probability figures and the respective gains and losses are *subjective*, the resulting IRR is a weighted arithmetic average of all the possible IRRs.

Scenario Distributions

Scenario	Probability of Scenario	IRR
1	0.1	-0.05
2	0.2	0.05
3	0.4	0.15
4	0.2	0.25
5	0.1	0.35

E(IRR) = (0.1)(0-.05) + (0.2)(0.05)+(0.4)(0.15)+ +(0.2)(0.25) + (0.1)(0.35)

E(IRR) = 0.15 or 15%

Sensitivity Analysis 1

Sensitivity analysis is a technique for analysing risk associated with investment projects. It looks at the *sensitivity of the profitability* of the project to *changes in key factors,* such as discount rates, sales prices, and input prices.

Such analysis assists in evolving the best strategy for the project, tackling its nature, size, the surrounding environment and relevant risks. E.g. variables that require a special focus will be clearly identified.

Sensitivity Analysis 2

It involves calculating for each factor, the *change* that will make the NPV = zero.

We can also change a variable by set amounts, to see the effect. For example, we can reduce the product price by 5%, so as to compute the resulting NPV for three other possible (lower) prices. E.g. if the original estimated price was £1 per unit, we can consider three other lower prices (95p, 90p, 85p).

Sensitivity Analysis 3

Usually variations in each key factor are made separately, however dual-factor or multi-factor changes analyses are possible.