AFIN102: Finance 1b Notes

ACST101 Revision: NPV, IRR and Payback

Comparing Projects

There are many ways to compare projects, with the best methods taking account of:

- Time value of money
- Risk
- The value of the project to the firm

Net Present Value

The preferred method to value projects, it is the same as the discounted cash flow (DCF) valuation.

$$NPV = V_0 = \sum_{t=0}^{T}\left(\frac{C_t}{(1+r)^t}\right)$$
$$= C_0 + \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \cdots + \frac{C_T}{(1+r)^T}$$

The time value of money is incorporated in the discount rate while risk can be factored in by increasing the discount rate (decreases NPV). The decision criteria is that projects with positive NPV should be accepted, adding to a firm's asset value and share price.

Internal Rate of Return

The internal rate of return is the discount rate that makes a projects NPV equal to zero.

$$NPV = C_0 + \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2}$$
$$0 = C_0 + \frac{C_1}{(1+r_{IRR})^1} + \frac{C_2}{(1+r_{IRR})^2}$$

The decision rule is to accept projects with an IRR greater than the required return of the project.

- If a projects IRR is greater than the required return, NPV will be positive
- IRR = r → NPV = 0
- IRR < r → NPV is negative

IRR Problems:
Similar to NPV, IRR takes the time value of money and risk into account. IRR is very intuitive since people and managers are familiar with returns. However issues include:

- Scale effects when comparing mutually exclusive projects (projects with a higher IRR may not increase wealth as much as mutually exclusive projects with a higher NPV).
- Multiple feasible IRR's for projects with non-conventional cash flows (both inflows and outflows during the projects life period).

Payback Period

Payback period is measured in years and shows how long the project takes to 'pay itself off'. Shows how many years is expected to re-coup the cost of the project and break even.

Projects with shorter payback periods are preferred and often managers have a threshold on the number of years a project should be paid off to be accepted.

An advantage of this method is its simplicity to understand and calculate. However, disadvantages include:

- Doesn't explicitly take the time value of money or risk into account.
- Provides no indication about how much more the firm will be worth if the project is accepted.
- Ignores all cash flows after the payback period
- Suffers from the same scale effects as IRR when ranking mutually exclusive projects.

Returns and Inflation

Asset Classes

The main investable asset classes are:

- Equity: Dividends are the periodic cash income from stocks and shares
- Property: Rent is the periodic cash income from real estate, land and equipment
- Debt:
    - Long term debt such as bonds (coupons) or loans (loan payments as periodic cash income). Both bonds and loans pay the principal/face value at maturity
    - Short term debt with maturity of less than 1 year including bank accepted bills (BABs), certificates of deposit (CDs) and promissory notes (PNs) generally only pay principal.

Derivatives like options, futures, forwards and swaps are not considered investable asset classes as they are mostly used for hedging (reducing risk and return) and speculating (gaining risk and return), not as a store of value. They tend to be short term instruments and their value is often derived from the 3 main investable asset classes.

Income, Capital and Total Returns

Total returns can be classified into:

Income Return:
The proportion of the asset's price that is paid out in cash per time period.

$$r_{income,0-1} = \frac{C_1}{P_0}$$ Where C1 is the cash flow at t=1 and P_0 is the price at t=0

Capital Return:
Rate of increase in the asset's price per time period.

$$r_{capital,0-1} = \frac{P_1 - P_0}{P_0}$$

When a dividend is paid (when the ex-dividend date occurs), the stock price falls. Therefore, all things remaining equal, dividends (income returns) come at the expense of capital returns.

Total Return:

$$r_{total,0-1} = r_{capital,0-1} + r_{income,0-1}$$
$$= \frac{P_1 - P_0}{P_0} + \frac{C_1}{P_0}$$

Calculation Example: Components of Returns

Question: A stock was bought for \$10 at t=0.

At t=1 the stock paid a dividend of \$1 and immediately afterwards the price of the stock was \$9.50.

At t=2 the stock paid no dividend and its price was \$12.

All time periods are measured in years.

Find the total, dividend and capital returns of the stock over the first and second years.

Over the first year (from t=0 to t=1):

$$r_{income,0-1} = \frac{C_1}{P_0} = \frac{1}{10} = 0.1 = 10\%$$

$$r_{capital,0-1} = \frac{P_1 - P_0}{P_0} = \frac{9.50 - 10}{10} = -0.05 = -5\%$$

$$r_{total,0-1} = r_{income,0-1} + r_{capital,0-1}$$
$$= \quad 0.1 \quad + \quad -0.05 \quad = 0.05 = 5\%$$

Inflation and Rates of Return

Inflation is the increase in the general level of prices in an economy. Positive inflation reduces the buying power of money. Returns (Effective returns or APRs) are usually stated as nominal returns (not reduced by the rate of inflation).

Fisher Equation:
To incorporate 'inflationary expectations' into a loan contract, the real rate of interest needs to be adjusted by the amount of inflation expected. Δ

$$r = i - \Delta \text{Pe} \qquad\qquad r = \frac{(1+i)}{(1+inflation)} - 1$$

The Fisher Equations only work with total or capital returns. With income returns, discount the income cash flow by the inflation rate.

Book Values, Market Values and The Accounting Identity

The accounting identity uses the book value of items on the balance sheet: A = L + OE

The finance version is very similar, using market values instead of book values. The market value of assets (V) equals the market value of debt (D) plus the market value of equity (E)

V = D + E

Book Values: A = L + OE
Book values are accounting figures usually taken from the balance sheet (Statement of Financial Position). Since most balance sheet items are recoded at historical cost, book values are accurate when first recorded but become out of date.

Market Values: V = D + E
Market value is the current price that an asset is actually traded at. If the asset was sold, then the market value would be the cash flow received. They are timely and useful but can be difficult and costly to measure (especially if the asset is illiquid and not traded often) and if the market price cannot be observed, the estimation needed is inaccurate.

Book Value of Equity (OE)

$$OE = Contributed\ Equity + Retained\ Profits + Reserves$$

- Contributed Equity is the amount of shares first bought when the company floated or had its IPO
- Retained Profits is the accumulation of net income less dividends since the IPO
- Reserves includes things like Asset Revaluation Reserve and Foreign Currency Translation Reserve

Market Value of Equity (E)

$$E = P_{Share} \times N_{Shares}$$

The market value of equity is the share price traded on the ASX multiplied by the total number of outstanding shares. Also called the market capitalization of equity 'market cap'.

Contrasting Book and Market Values of Equity:
When a new firm first floats its IPO, the book value of equity will equal the market price. The market value of equity will then fluctuate as the stock is traded. The book value of equity will only change when the firm makes a profit or loss and increases its retained profits or raises more contributed equity in a rights issue.

If a firm wants to take over another firm, it will buy all the target firm's equity or a controlling stake. The acquirer pays the market value of equity to the target firm's shareholders, often much higher than the book value.

Balance Sheet Equations

The Balance Sheet can be represented as an equation:
A = L + OE or V = D + E

Book total assets can be broken into:

- Current Assets (CA) such as cash, inventory and accounts receivable, generally expected to last for less than 1 year
- Non-Current Assets (NCA) such as property, plant and equipment (PPE), copyrights, patents, deferred tax assets and other things lasting more than one year

Similarly, for total liabilities (L):

- Current Liabilities (CL) such as short term loans including overdrafts, accounts payable
- Non-Current Liabilities (NCL) like bonds, loans and deferred tax liabilities lasting more than 1 year.

Business Decisions

Most of the business decisions are related to the balance sheet:

- **Investment Decision:** Which assets to buy (V or A)
- **Financing Decision:** Which type of funding (L or OE). The financing decision is about how to finance the business's assets. If there isn't enough cash to buy assets, more cash must be raised by issuing liabilities such as loans, bills or bonds or by issuing shares.
- **Working Capital Decision:** How much working capital (CA – CL)
- **Payout Policy Decision:** How much to pay out to equity holders (OE) in the form of dividends and buybacks (repurchases).

The investment decision is the most important. The idea is to accept the most positive NPV projects since that will maximize the business's market value of assets (V) and therefore also maximize shareholder's wealth.