

Class: M.Sc. Sem 3

Subject : Actuarial Practice 1

Chapter: Unit 3 Chapter 1

Chapter Name: Returns on Asset

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1 Expected and Required Returns

Required return



The return an investor requires from an asset class can be written as:

Required return = required risk free real rate of return + expected inflation + risk premium

The components of the above relation seems valid because :

- A. Required risk free real rate of return** acts as a reward for investing his cash and not spending.
- B. Expected inflation** because the investor would not want his cash value to erode in future due to high inflation. If there is no compensation for inflation, the investor would prefer using his cash currently than suffer a reduction in value in future
- C. Risk premium** as the compensation required for investing in a risky asset, when cash can also be invested in risk free assets

1 Expected and Required Returns

The return an investor requires from an asset class can be written as:

Required return = required risk free real rate of return + expected inflation + risk premium

The terms on the right-hand side of the equation above represent **market averages** as investors are considered a class here. This means that the above returns are averages derived from various investment classes such as bonds, equity, property etc because investors have different investment preferences.

It is assumed that the **risk-free rate** defined by the market is in **real terms** and not nominal and can be taken as the inflation index linked yield on government bonds as they are almost risk-free instruments

The risk premium on a particular asset class will depend on the characteristics of the asset and investor's preferences which are largely driven by their liabilities. A **higher return** will be required from **riskier asset** classes. The risk premium will cover any adverse feature of one investment relative to another for which investors require compensation.

1 Expected and Required Returns

Expected return



Expected return can be analysed as :

Expected return = initial income yield + expected capital growth

The expected return is what an **investor expects** from having invested in an asset based on the :

- **Price paid** in acquiring the asset
- The price at which the investor **expects to sell** the asset
- The **expected income** that can be earned from the asset for the time it is being held

Determining whether an asset seems cheap



If for an investor, the expected return exceeds the required return, the asset appears cheap.

1 Expected and Required Returns

Required vs expected returns

If assets are **fairly priced**, then **required** and **expected returns** will be at the **same** level.

One market model that expresses this idea is the **Capital Asset Pricing Model (CAPM)** where expected returns are expressed as the returns on a risk-free asset plus a risk premium dependent on the systematic risk of the asset. It is a finance model that establishes a linear relationship between the required return on an investment and risk and assumes that the expected return is the required return.



$$ER_i = R_f + \beta_i(ER_m - R_f)$$

ER_i = expected return on investment

R_f = risk-free rate

β_i = beta of investment

$(ER_m - R_f)$ = market risk premium

The beta of an investment is a measure of how much risk the investment will add to a portfolio that looks like the market.

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2 Further Analysis of Expected Returns

In reality, investors may not always receive the returns they were expecting from risky assets. Therefore, even if assets are **fairly valued** at the time of being purchased, **risk premiums** cannot be simply measured by comparing **returns on risky and risk-free assets**. Earlier we equated expected return as

Expected return = initial income yield + capital growth

Alternatively, the **total return on an asset** can be expressed, to a first approximation as:

Expected return = initial income yield + income growth + impact of change in yield

Initially capital growth is seen as the change in price of an asset, but in this equation, it is equated to the sum of income growth and yield change.

Consider an investment which provides a stream of income in **perpetuity**, then its price calculated using the cashflow discounting model would be the discounted value of its income

$$price = \frac{income}{income\ yield}$$

Price is the initial income multiplied by an annuity payable in perpetuity.

2 Further Analysis of Expected Returns

Therefore, from the above equation, any change in price can be credited to:

- A change in the level of **income**, or
- Any change to the **income yield**

When analysing the expected return on asset classes over long periods of time it is also necessary to take account of the **reinvestment of income** at different initial yields and second order terms arising from the fact the expected return is expressed as a **sum of percentage increases** rather than as a product.

In other words, expected returns should be represented as a **product of capital growth** and **income growth** where in :

$$(1+i) = (1+ d)(1+ g)$$

i = expected return

d = income yield

g = capital growth

2 Further Analysis of Expected Returns

Equities

Economic growth or GDP is a result of land, labour and capital. When a company earns **profits**, they are distributed amongst the **providers of labour** (employees) and **providers of capital** (shareholders).

In the long run equity dividend growth might be expected to be **close to growth in GDP**, assuming that the share of GDP assigned to capital remains intact. Hence equity investment is therefore expected to give a **real return** close to the growth in real GDP plus the equity yield.

From a historical data perspective, this seems like a reasonable model, however considering **short term fluctuation** is also significant and the actual returns achieved by investors will depend on the exact timing of deals as well as their tax positions.

For example, if an investor buys property at a market peak and sells it at a trough, then you can end up with a substantially low return

There is however a dilution effect due to the need for companies to raise new equity capital from time to time if dividend yields are high.

2 Further Analysis of Expected Returns

When a company issues new shares by a rights issue or the conversion of convertibles, the existing owners have the option of taking up their rights or not. If they do not take up all their rights, the overall proportion of equity they hold reduces compared to the new level of total equity, and so does their proportionate share in profits and hence the total dividend.

The **dilution effect** also depends on the extent to which economic growth is generated by start-up companies

2 Further Analysis of Expected Returns

Conventional Bonds

For **fixed interest bonds**, there is no rise in income. The **initial yield** and the **capital value** change for a bond held to redemption combine to give a fixed nominal total return, referred to as the gross redemption yield.

The analysis of total returns compared with inflation is relatively straightforward:

- During periods when **inflation** turns out to be **higher** than expected, **real returns** from fixed interest stock erode in their value and are poor when compared to equities.
- In periods when **yields are rising**, real returns from fixed interest stock seem **poor** when compared to bonds which have floating yields

However, the argument for investing in fixed interest bonds stems from the fact that for scenarios which are opposite of the above two scenarios where future inflation rates turn out to be lower than expected and yields are falling, fixed interest bonds seem to be providing **better returns**.

The second point exists because, a **rise in yield leads to a fall in bond price**. When a previously purchased bond is sold at a reduced price, the nominal return achieved is poor

2 Further Analysis of Expected Returns

Index-linked bonds

The **real return** on **index-linked bonds** is known at outset, if they are held to **redemption**. This real yield is often taken as the benchmark required real yield for the analysis of expected returns on equities.

A **fairly priced equity** will give a real return equal to inflation linked government bonds plus some risk premium.

Index-linked bonds will however not provide complete protection against **inflation**, due to the presence of time lag. The next nominal payment is known in advance due to the presence of **time lag**. Therefore, if a time lag of n-months exist, then the bond will not provide protection against inflation in the last n-months of the bond's life.

However, if index-linked bonds are sold before redemption, then the **actual real return** will depend on the price for which the bond is sold. The selling price of the bond will then be regulated by the market forces of demand and supply

2 Further Analysis of Expected Returns

Cash

Returns on cash might be expected to exceed inflation except in periods when inflation is rapidly rising and investors under-estimate it. Investors expect to achieve a real rate of return on their investments for the purpose of protection against inflation erosion, to match liabilities in real terms etc.

Short-term real interest rates may be lowered or raised by the government, based on their financial policies



Suggest reasons why a government may keep real interest rates very high for a significant period.

2 Further Analysis of Expected Returns

Earnings

Investors are interested in the **growth in earnings**, especially when their liabilities are earnings related. For example, a defined benefit pension scheme, where the pension fund payable is based on the earnings in the final months of the employee services.

Earnings are assumed to grow in line with **economic growth**. Economic growth is attributed to the usage of land, labour and capital. An increase in economic growth, leads to an increase in profitability. And when profits are equitably distributed amongst land, labour and capital, wages are also likely to increase

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