

# Risk Management

## Topic 1

### Introduction and Overview of Risk

#### **1.1 The Emergence of Risk Management.**

The traditional definition of risk was “will the investor get their money back”. In finance we regard risk as “The possibility that an outcome may differ from expectations”. In the finance literature risk is more specifically defined as “variability of returns”. The meaning and implications of this will become apparent as we progress through this course.

The risk question is now more likely to be “will this asset generate the required return?” We use statistical measures of risk to assess past performance of an instrument and to help us infer its future returns, and anticipate the variability of those returns.

The world financial markets are bigger, and trading in more countries than ever before. Since the emergence of deregulation in major financial markets around the world and the collapse of many price-fixing mechanisms, the open market operations of financial markets participants have seen rapid growth. Trading opportunities for market participants have increased. The increase in trading has increased the variation in prices for financial assets. Increased price variability brings increased risk, and prudent market participants now demand new forms of protection from

## 1.17 Resources risk

Every business uses resources -- from the sole trader providing the time and energy to the multinational leading raw materials, water, power, labour, plant and machinery or transportation.

The key issues are: is what you need available?

when required?

In sufficient quantity?

Of the right quality?

At an acceptable price?

Will it continue to be  
available?

What are the threats to  
supply?

Is the price likely to  
change?

Are there suitable  
alternatives?

If your critical resource is an intellectual asset, have you taken the necessary steps to protect it? It may be possible to enter into term contracts for the supply of goods and services, but what if your counterparty defaults, or is prevented from honouring its obligations?

## 2.3 FX CROSS RATES

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A cross-rate is an exchange rate in which neither of the currencies quoted is the USD.

Example:

SGD/HKD    SGD commodity currency in HKD terms

GBP/SGD    GBP commodity currency in SGD terms

## 2.4 FX/Currency Risk in Overview:

Unless 'fixed' by their government at a set rate of exchange or within 'bands', the rate at which a country's currency can be converted into the currencies of other countries changes all the time, i.e., it 'floats' against the currencies of its country's trading partners.

Currency exchange rates can be very volatile. Between major currencies, substantial movements may be experienced over relatively short periods of time. If a currency movement is in your favour, this can result in an unexpected windfall, but few businesses operate on margins that can comfortably absorb large negative swings.

Remember that the future amount in each currency (say, SGD and USD) would be:

$$F_{\text{SGD}} = (1 + r_{\text{SGD}}t)$$

and  $F_{\text{USD}} = (1 + r_{\text{USD}}t)$

where the equivalent PV amounts of each currency are the spot rates.

Say the spot rate is SGD/USD = 0.6230, and the SGD amount is \$10million. This would suggest that the equivalent USD amount is

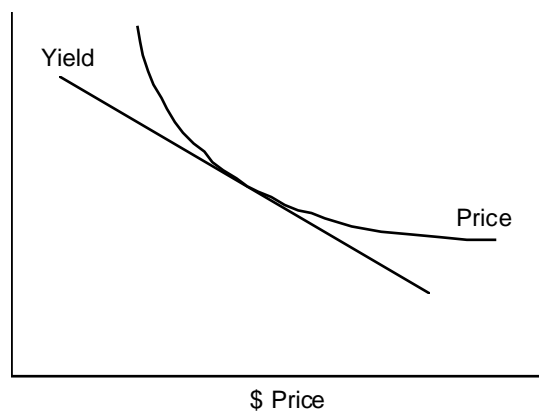
$$\text{SGD}10,000,000 \times 0.6230 = \text{USD}6,230,000$$

The ratio of the future amounts (in three months) will give us the forward rate

$$f_{\text{SGD/USD}} = F_{\text{USD}}/F_{\text{SGD}}$$

We can extend this line of thinking to arrive at a formula for calculating the forward rate. To do this we start with the spot rate and adjust it according to the ratio of the future amount of the terms currency over the future amount of the commodity currency.

Using PVBP or duration alone for risk management assumes a straight-line relationship between changes in prices and changes in yield. In fact, when a bond's price changes are plotted against a bond's yield change, the resultant plot line is curved and it has a convex shape. Duration serves well as a measure of sensitivity to small changes in yield. Large changes in yield require a more complex measure – sensitivity to large changes in yield is measured by *convexity*.



The further away we move from the current yield, the greater the difference between the expected change in price provided by Duration measures and the actual change in price. Supplementing duration as a risk measure is convexity, which captures the curvature (or convexity) of a bond price change. Convexity, by adding another term, increases the accuracy of the bond sensitivity equation.

Note:

*The FRA is always separate from the underlying borrowing.*

### 4.9.3 FRA Formula:

$$\text{Settlement}_{(\text{to lender})} = \text{Value}_{\text{mkt}} - \text{Value}_{\text{Agd}}$$

$$\text{Settlement}_{(\text{to lender})} = \frac{F}{1 + rt_{\text{mkt}}} - \frac{F}{1 + rt_{\text{agd}}}$$

Where:  $F$  = Face Value of Loan (or Bill)

$r_{\text{agd}}$  = FRA agreed rate

$r_{\text{mkt}}$  = Market rate at Settlement Date

$t$  = term of security (in years)

### Example:

FRA Term 3:6

Face Value 2,000,000

FRA rate 8.45%

If at settlement (3 months from now), market rate drops to 8.25%