

Futures and Forwards

As pointed out in chapter 1, futures trading, or more accurately forward trading, was the first form of derivatives trading. This chapter reviews the basic concepts of futures trading – its functions, the mechanism by which risk is transferred, the role of speculation and related issues. At the outset, it is necessary to understand clearly what futures trading means.

Definitions

A forward contract is an agreement between two parties to buy or sell, as the case may be, a commodity (or financial instrument or currency or any other underlying) on a pre-determined future date at a price agreed when the contract is entered into.

The key elements are that:

- the date on which the underlying asset will be bought/sold is determined in advance; and
- the price to be paid/received at that future date is determined at present.

Example 3.1

In the month of August, a rice mill agrees to buy 2.35 tonnes of rice of IR-8 variety from X, a farmer, in the following February at a price of ₹ 38,000 per tonne. This is a forward contract. Note that the farmer will receive (and the mill will pay) ₹ $38,000 \times 2.35 = ₹ 89,300$ in February irrespective of whether the market price in February is ₹ 40,000 per tonne or ₹ 36,000 per tonne. According to its terms, this contract may or may not be transferable by the mill or the farmer to any other person and accordingly may be called a 'transferable' or a 'non-transferable' forward contract.

A *futures contract* is a contract to buy or sell, a standard quantity of a standardised or pre-determined grade(s) of a certain commodity at a pre-determined location(s), on a pre-determined future date at a pre-agreed price. If this definition is studied carefully, the differences between a futures contract and a forward contract become apparent:

- a. There is no reference to an agreement ‘between two parties’ – this is because futures contracts are almost always entered into through an intermediary (the exchange or its clearing house) that acts as the buyer to each seller and seller to each buyer. This is illustrated below:

Figure 3.1: Forward

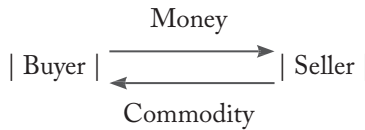
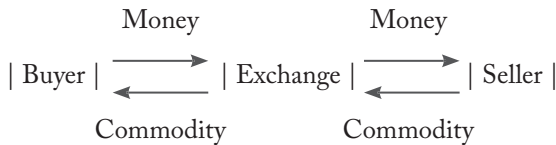


Figure 3.2: Futures



The absence of a one-to-one relationship between the buyer and seller also means that these contracts are freely transferable.

- b. There is a standard quantity for contracts, which is fixed by the exchange. (For example, in the international gold futures markets, transactions are in lots of 100 oz. each.)
- c. There is a pre-determined or standardised grade or, grades of the commodity, specified by the exchange, which can be delivered/taken delivery of. Where several varieties are deliverable, one variety is specified as the ‘deliverable grade’ or ‘basis variety’ or standard variety;¹ if any other variety is delivered, a premium or discount is charged/offered.
- d. The giving or taking of delivery is at a location specified by the exchange.

Example 3.2

In the same case as example 3.1, if the transaction takes place through a commodities exchange, the mill will buy 2 tonnes of month of February rice at the prevailing futures price of ₹ 38,000. The farmer will simultaneously sell 2 tonnes of February rice at a price

1 The term ‘basis variety’ has been in common use in Indian commodity markets to describe the standard variety of a commodity futures contract. This should not be confused with the term ‘basis’ which denotes the price difference between spot and futures at any given time.

of ₹ 38,000. This is a futures contract. Note that it is not possible to transact 2.35 tonnes or specify precisely the variety of rice to be delivered as these are based on standardised lot sizes and standardised deliverable varieties. The farmer will receive from the exchange, and the merchant will pay to the exchange, ₹ 38,000 per tonne in February irrespective of whether the market price in March is higher or lower.

Essentially, therefore a futures contract is a standardised forward contract. In a futures contract, all matters except price are pre-determined, making the contract freely transferable between different participants, as they know exactly what is being traded. In a forward contract, all these have to be specified in each contract, i.e., which variety or grade, what quantity, where delivery is to be given/taken, since there is no standardisation. Thus, every futures contract is a forward contract; not every forward contract is a futures contract. In the remainder of this chapter, the terms forward and futures will be used interchangeably.

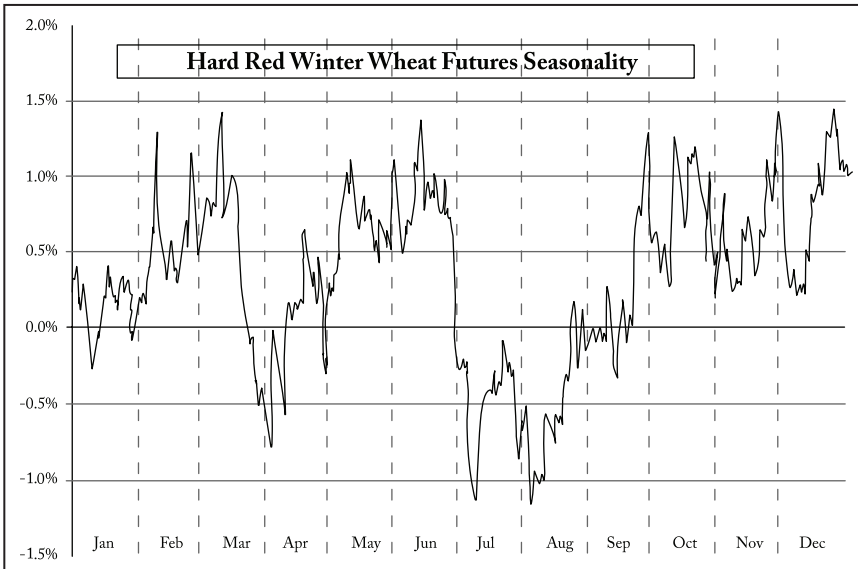
Seasonality in commodity markets

Commodities are different from purely financial assets in some critical ways. It costs money to store and safeguard commodities when compared to financial instruments like bonds or shares which are either pieces of paper or mere book entries in a ledger. Production (supply) and consumption (demand) may be seasonal.

Consider the case of a farmer – an agricultural entrepreneur, taking risk in the true sense – who grows wheat. Wheat in India is largely a *rabi* crop, i.e., it grows primarily in the winter. Some wheat is also produced outside the *rabi* season. Thus, the crop is grown predominantly in one season but consumed throughout the year. During the time when the crop is not being harvested, it needs to be stored. Storage has direct costs (rents, pest spraying etc.) and indirect costs (deterioration, loss due to pests) amongst others. In addition, when someone buys wheat, funds are locked up in the purchase of wheat and the funds have an opportunity cost in the form of the interest that could have been earned on them. In such a case, where the crop is highly seasonal, the price for the future prices of wheat will be a zigzag pattern whereby costs keep on rising till the winter harvest season comes and then prices fall. Next year, the same pattern will repeat. The underlying secular price trend could be up, down or flat or ambiguous but that does not detract from the above point.

Here is a forward pricing graph drawn from the United States where wheat is grown twice a year – once in winter, once in spring followed by a six month or so gap for next year. It displays the expected zigzag pattern.

Figure 3.3: Hard red winter wheat futures' seasonality



Source: Equityclock.com. Y-axis shows change in price.

Example 3.3

Wheat is selling for ₹ 25 per kilo (that is, 2,500 per Indian quintal, which is equivalent to 100 kgs). Assume that the cost of storing for one month is 50 paise per kg. The interest rate is 1 per cent per month. What is the cost of storage of 10 quintals of wheat for four months? (Ignore wastage losses and convenience benefits).

Solution:

Cost of 10 Indian quintals = 1000 kg = ₹ 25,000 initial cost.

Interest cost per month = 1 per cent \times ₹ 2500/ quintal \times 10 quintals = ₹ 250

Storage cost per month = ₹ 0.5/kg \times 1000 kg = ₹ 500

Total additional cost = ₹ 750 per month \times 4 months = ₹ 3,000.

If wheat could be grown every four months (three times a year) and otherwise the price remains absolutely stable, the future cost of wheat would be a linear zigzag from ₹ 15,000 to ₹ 18,000 with the frequency being three times per year.

The extent of this zigzag pattern would depend on the extent of the storage cost *vis-à-vis* the cost of the commodity as well as on the seasonality of production. Seasonality implies that production arrives in periodic bursts after harvests. In the case of wheat, the storage costs are significant. In the hypothetical case in Example 3.3, the storage costs were larger than the interest cost. This is typical of grains and other agricultural commodities which are bulky and subject to deterioration through pests etc.

Gold's storage cost is a much lower fraction of its price than in the case of wheat.² It is also mined continuously and there is a large stock of gold relative to the annual 'flow' from mining (since gold is not 'consumed' or eaten away but retained in ornament or bullion form).

These characteristics (continuous production like gold vs. discontinuous production like wheat, low relative cost of storage like gold vs. high relative cost of storage like wheat, large stock vs. small flow in the case of gold, large annual flow vs. relatively small stock in the case of wheat) help to explain the different pricing patterns of different kinds of commodity and financial markets. This will be explored further in chapter 4.

Hedging: The mechanism of risk transference

In the previous chapter, it was seen that hedging is the primary function of derivatives markets. In the case of futures markets, how exactly is risk transferred through hedging?

In general, a person wishing to avoid upward price risk would BUY futures contracts, thereby defining for himself the price at which he will eventually purchase. A person wishing to avoid downward price risk would SELL futures contracts. This is best understood by examples.

Example 3.4

In the month of May, a textile mill anticipates a requirement of 5,000 bales of cotton in the month of October. The prevailing price of cotton is ₹23,000 per bale. Based on this price, the company has entered into other financial arrangements, including for the eventual marketing of its output. It is important to the mill that, at the time the cotton is actually purchased, the price is not substantially higher than this. It therefore buys 5,000 bales of cotton on the cotton

2 Nevertheless, there are economies of scale when it comes to security and insurance of collective gold deposits which may explain partially the popularity of Gold ETFs.

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futures market, where it is currently quoted at ₹23,900. Note that the futures price is not identical to the spot price. The difference between them (₹ 900) is called the 'spread' or 'basis'.

In the month of October, it turns out that cotton prices have risen sharply with the current spot price being ₹ 30,000. The corresponding futures price for October cotton is found to be ₹ 29,850. (Note that the spread is now a negative amount of ₹ 150.)

At this point, the mill has two options:

(a) It can sell its futures contract on the market at the ruling rate, and buy its requirement separately from the spot market.

In this case, the financial implications will be as follows:

October cotton bought at:	₹ 23,900
October cotton sold at:	₹ 29,850
Gain on the transaction at:	₹ 5,950
Current spot price of cotton:	₹ 30,000
LESS profit on futures per candy:	₹ 5,950
Nett cost per candy:	₹ 24,050

Thus, the futures transactions have ensured the minimisation of upward price risk to ₹ 1,050 per candy even though the price went up by ₹ 7,000. The net price does not work out exactly to ₹ 23,000 because of changes in 'spread'. The spread has changed from +900 to -150, which is ₹ 1,050.

(b) The mill could take delivery of cotton directly from the futures market. In this case, the price paid by it would be ₹ 23,900, as per its original futures contract. However, delivery in a futures market may consist of any one out of several specified varieties of cotton. This may not suit the mill as it may not be the exact variety which the mill needs. As such, this practice is not common, and most hedgers do not take delivery but instead 'close out' the contract as outlined in (a) above.

In either case, the price paid by the mill is close to the level it wished to pay when entering into the hedge.

Example 3.5

A soya bean farmer anticipates a bumper crop amounting to 200 quintals, which he expects to harvest in the month of October. Currently (in the month of May) soya bean is selling at ₹ 3,750 a quintal. This price is acceptable to the farmer and will give him a sufficient return. However, he is apprehensive of a fall in price by the time the crop is ready. He, therefore, sells 200 quintals on the soya bean futures market at the current rate of ₹ 3,700. Note that the spread or basis is ₹ 50.

In the month of October, it turns out that soya bean prices have in fact risen, instead of the expected fall. The current spot price is ₹ 4,000 a quintal. The ruling rate on the futures market is ₹ 3,975. Note that the spread is now minus ₹ 25.

As with the case of the textile mill, the farmer also has two options:

- a. *He can buy back 200 quintals of October soya bean on the futures market at the present futures price of ₹ 3,975. He can then deliver his actual crop of soya bean in the spot market at the ruling rate of ₹ 4,000. In this case, the financial consequences are as follows:*

<i>October soyabean sold at:</i>	₹ 3,700
<i>October soyabean bought at:</i>	₹ 3,975
<i>Loss on transaction per quintal:</i>	₹ 275
<i>Price actually obtained on spot market:</i>	₹ 4,000
<i>LESS loss on futures market per quintal:</i>	₹ 275
<i>Net price obtained is:</i>	₹ 3,725

This is very close to the spot price prevailing at the time of the transaction but not exactly equal because of changes in spread. He has realised a price of ₹ 3,725 against the target of ₹ 3,750. The difference reflects the change in spread from -50 to -25.

- b. *Alternatively, he can deliver in the futures market at ₹ 3,700 a quintal.*

It may be seen that, in either alternative, as a result of hedging the actual net price obtained by the farmer is almost the same as that which he had budgeted for. No doubt, in this particular example the farmer would have been better off by not hedging. But the price of avoiding unfavourable price risk is the forgoing of favourable price risk. After all, one cannot eat the cake and have it too!

Thus, hedging through futures involves:

- purchase of futures by those hedging against upward price risk; and
- sales of futures by those hedging against downward risk.

The multi-purpose concept of hedging

Having identified hedging as the main function of a futures market, it is worth looking at the different types of hedging. Hedging, in its broadest sense, is the act of protecting oneself against loss. In the more specific context of futures trading, hedging was (and to a large extent still is) regarded as the use of futures transactions to avoid or reduce price risks in the spot market. Originally, hedging was thought to be of only one kind (known as routine or naive hedging), whereby the trader always hedged all his transactions purely with the intention of cutting out all price risks, in the manner of examples above. However, Holbrook Working³ (a pioneer in the field of economic research

3 H. Working, 'Hedging Reconsidered', *Journal of Farm Economics*, Vol. XXXV, November, 1953.

on futures trading) challenged this view and propounded the multi-purpose concept of hedging which has now received universal acceptance. He showed that hedging was used for many other purposes:

- a. *Earning a carrying charge for a stockist (carrying charge hedging):* According to Working, stockists watch the price spread between the spot and futures prices; and when the spread is such as to cover their carrying costs, they buy ready stocks. Thus, whereas traditional theory had it that hedges are used to protect against loss on stocks held, Working felt the decision is 'not primarily whether to hedge or not, but whether to store or not'.⁴
- b. *Operational hedging*, meaning the use of futures markets as a substitute for cash or forward transactions because futures markets are more 'liquid' and have a lower difference between 'bid' and 'asked' prices. This is because the futures market is often so liquid that large transactions can speedily be effected with very small impact on ruling prices. A transaction of similar size on the spot market cannot be put through without causing a significant ripple. Later, the required purchases or sales are gradually effected on the spot market, with hedge positions being correspondingly reduced over time. Thus, in such cases, hedges are used because they are operationally convenient, not because they are risk-reducing.
- c. *Selective or discretionary hedging* whereby traders do not always (i.e., routinely) hedge themselves but only do so on selective occasions when they anticipate an adverse price movement. Thus, hedgers do not seek to avoid price risks, but rather adverse price risks, meaning in effect that they may hedge only when adverse price risk is expected. Even at such times owing to their uncertainties about expectations, they may hedge only partially.
- d. *Anticipatory hedging* which is resorted to in anticipation of subsequent sales or purchases; thus a farmer might hedge by selling futures in anticipation of his crop, while a processor might hedge by buying futures in anticipation of subsequent raw material needs.

Based on his multi-purpose hedging concept, Working defined hedging as 'the use of futures contracts as a temporary substitute for a merchandising contract'.

4 H. Working, 'New Concepts Concerning Futures Markets and Prices', *American Economic Review*, Vol. LII, No. 3, June 1962, 438.

While Working was undeniably correct in dispelling the previous notion of hedging as a mechanical process, one is inclined to agree with R. Pavaskar⁵ that Working played down the risk aversion aspect rather too strongly. Even the other forms of hedging, essentially flow from the basic fact that, hedging is of a risk-avoiding nature. But for the fact that hedging is risk reducing, none of the other forms of hedging can take place. Carrying cost hedging is undertaken because stockists are confident of earning carrying costs, in other words they avoid the risk of not earning their costs. While it may be true that positive price spreads may encourage stockists to increase their stocks, those who are in the merchandising business cannot really avoid stocking altogether even if the basis is unfavourable. To this extent, merchandisers must carry out traditional hedging. Operational hedging is undertaken for convenience, but it is only possible because the futures market moves in tandem with the spot market, thereby obviating the price risk involved in not immediately buying up/selling on the spot market. Similarly, anticipatory hedges essentially aim at avoiding business uncertainties (if not price risks). As M. G. Pavaskar puts it, the risk-reduction aspect of hedging is therefore the major plank which supports the grand edifice of Working's multi-purpose concept of hedging.⁶

The significance of this conclusion is that whatever the motivation behind hedging, the risk-reducing concept can be used to measure the actual hedging efficiency of markets. However, it redounds to the credit of Working that he integrated the economist's traditional and naive risk avoidance concept with the complexities of real life commercial activity. Furthermore, the multi-purpose concept of hedging is also helpful in a more realistic interpretation of empirical results.

Hedging by governments

Hedging is not necessarily confined to the private sector. Derivatives can be used by governments to stabilise the prices of essential food imports or a country's export earnings or to protect farmers. Some countries are already making extensive use of futures and options for this purpose. For instance, Mexico has used options as part of a scheme to protect cotton growers: the

5 R. Pavaskar, *Efficiency of Futures Trading*, Popular Prakashan, Bombay, 1977, 22.

6 M. G. Pavaskar, *Economics of Hedging*, Popular Prakashan, Bombay, 1976.

Mexican government offers a guaranteed minimum price to cotton growers; a government agency then purchases options in the international markets, thereby offloading the risk.⁷ Ghana has used futures to hedge against falling cocoa prices (Ghana is a major cocoa exporter). Futures and options can be (and are) used by governments to hedge against short-term rises in import prices (e.g., the price of crude oil). In 2011, Mexico used corn futures to protect domestic consumers from rising corn prices. The use of derivatives by governments in developing countries is likely to increase and is being promoted by the World Bank as a measure of economic stabilisation.

Gearing or leverage⁸

The precise manner of speculation on futures markets is very similar to speculation through spot markets (like the cash segment of the stock market). However, there is one important difference: this is what is known as the gearing factor. A person who buys or sells futures contracts does not make full payment of the value thereof. Instead, he pays what is known as a 'deposit' or 'margin money', which is usually around 10 per cent of the contract value. This means that a person can 'gear up' his capital ten times, so that his profit or loss, as a proportion of his capital, is ten times magnified. This is illustrated by the example below.

Example 3.6

A speculator on the gold futures market anticipates a price increase from the current futures price of \$1,450. The market lot being 100 oz., he buys 100 oz. of gold at \$1,450 for a value of \$145,000. But the speculator is only required to pay out a margin or deposit of \$14,500. Now assume that a 10 per cent increase occurs in the price of gold, to \$1595. The value of 100 oz. at \$1,595 is \$159,500. Subtracting original contract value, the profit on the transaction is

$$\$159,500 - \$145,000 = \$14,500.$$

As far as the speculator is concerned, he has achieved a profit of \$14,500 on a capital of \$14,500. In short, he has achieved a 100 per cent profit through a 10 per cent price rise.

Thus, the gearing factor multiplies the effect of price fluctuations. This is one of the reasons for the attractiveness of the futures markets to speculators.

7 P. Varangis, T. Akiyama and D. Mitchell, *Managing Commodity Booms and Busts*, World Bank, 1995.

8 Gearing is the British English term; in American parlance gearing is known as 'leverage'.

While it is possible to achieve similar gearing in the stock market through the mechanism of margin trading (i.e., borrowing against shares), the act of borrowing involves a separate loan with attendant transaction costs; the futures market allows the gearing automatically without having to seek a loan or have an evaluation of creditworthiness. Also, even when margin trading is possible, the extent of gearing often does not match that of futures.

Of course, gearing also enhances losses and it is for this reason that regulation of speculative trading volume is necessary. Otherwise, it is conceivable that speculators may be unable to meet their obligations during a period of losses.

Short selling in futures markets

In the spot market, a person can only sell something which he has. Thus, if one wants to sell wheat today, one must first own wheat or at least borrow some wheat from someone else before one can sell it. However, in the futures market, it is possible to sell something without having it in the first place. Since delivery is only required after an interval of time, it is quite feasible for one to sell wheat on the futures market without possessing any wheat at the time of the sale. This is known as short selling. Because of this, it is possible to speculate on a fall in price with as much ease as it is to speculate on a rise in price. This greatly enhances the attraction of futures markets for speculation and leads to greater liquidity.

Trading mechanism of futures

Futures used to be traded in pits, but they are now mostly traded on electronic exchanges. Thus, there has been a change from floor-based trading based on shouting and gesticulations to a calmer yet faster environment of human beings on machines, and often algorithms doing high-frequency trading all by themselves.

A client who has opened a futures position incurs profits or losses on a daily, indeed during trading hours, second-by-second, basis but he does not need to hold his long or short contract until maturity. He can 'square it up', or offset it, by selling or buying another contract. Hence, if a speculator has bought a June Nifty futures contract in March, she can at any time close out the transaction by simply selling one June Nifty futures contract. She will pay or receive the net price difference between the two transactions.

There are two kinds of settlements that can be done for many financial derivatives – ‘delivery’ and ‘cash’. Delivery settlement means actually giving or taking the underlying, while cash settlement means settling in cash (i.e., squaring up) based on the difference of prices between the initial price (during the initiation of the contract) and the maturity date’s price of the underlying.

An important point worth noting is that ‘margin’ in the stock (cash) market is different from ‘margin’ in the futures market. In the former, it represents a loan to an investor to buy shares. In the latter, it represents a safety margin and not a loan. It is the amount kept aside with the exchange just in case the market moves faster than additional margin collection and the relevant party defaults.

Margin requirements in futures markets are of multiple types. There is an initial margin requirement and there is a maintenance margin requirement, with the maintenance margin being lower than or equal to the initial requirement.

Box 3.1: The National Spot Exchange Limited case

In India, as elsewhere, when somebody buys an exchange-traded futures contract, the trader or investor has to post a margin. For options, there are also premium margins, and for the clearing members – often the big brokerages – there is an additional ‘assignment margin’. These margin requirements are there to ensure the safety of the two parties transacting through the exchange. Generally, the system works well. But if there are problems with the *exchange itself*, the system may fail and this can have widespread adverse consequences. The National Spot Exchange Limited (NSEL) in India (not to be confused with the National Stock Exchange, NSE) is a commodities exchange that was forced by regulators to suspend trading as it allegedly committed irregularities. Amongst other things, regulators alleged that it did not have the physical underlying commodities in its warehouses, on which it was liable to ensure delivery to people who bought forward contracts on them. It defaulted on payment liabilities amounting to over ₹ 5,000 crores. While the matter is still the subject of court cases and some of the facts are in dispute, regulators alleged that NSEL created contracts which were effectively loans against commodities but did so without the borrowers depositing the underlying commodities as they were supposed to. NSEL has denied the allegations. The wider point is that counter-party risk in futures and exchange-traded options is absent only if the exchange functions properly.

Measurement of hedging volume *vis-a-vis* speculative volume

It is of much interest to regulators and economic analysts to be able to distinguish between those transactions carried out for hedging and those carried out for speculation. The regulatory authorities usually have some kind of statistical data on hedging volume in order to give (or take away) exemptions from margin requirements. However, it is quite conceivable in practice that a transaction which is classified for regulatory purposes as a hedge may be entered into with a speculative motive. From an analytical point of view therefore, such data is unreliable though, where available, it is better than nothing.

M. G. Pavaskar⁹ propounded the view that the volume of actual deliveries against a futures contract can be taken as a rough indication of short hedging volume. However, as Baer and Saxon¹⁰ pointed out, there is little need for a short hedger to give delivery and most hedging transactions are in fact concluded by means of the 'closing out' process. It is possible for a speculator to give or take delivery as part of his speculative transaction. For an economic analyst, therefore, there is considerable difficulty in making reliable quantitative distinctions between hedging volume and speculative volume. This is perhaps understandable because the distinction between hedging and speculation lies purely in the intention behind the transaction and intentions are not public knowledge. In many futures markets, especially nowadays, the speculative volume is known to exceed the hedging volume greatly.

Long vs. short and long hedging vs. short hedging

The use of the terms 'short' and 'long' in derivatives markets is a source of much confusion to the uninitiated. The difference between short and long does not, as might appear at first sight, have anything to do with the length or duration of a transaction as it does not correspond to 'short term vs. long term'. In market jargon, 'going short' means selling and 'going long' means buying. Correspondingly, in a general sense, 'being short' means having a net sold position, or a commitment to deliver, while 'being long' means having a net bought position or an actual holding of the commodity or financial instrument or other underlying asset. The terms 'long' and 'short' apply to both spot and futures markets, and have a wide connotation.

⁹ M. G. Pavaskar, *Economics of Hedging*, *op.cit.*

¹⁰ Baer and Saxon, *Commodity Exchanges and Futures Trading*, *op.cit.*, 54.

A person who holds stocks of a commodity is obviously regarded as ‘being long’ in the spot market; but it is not necessary to actually hold stocks. A farmer who expects to harvest a crop is also regarded as ‘being long’ in the commodity (on the spot market). A person who has made a forward sale is (obviously) regarded as ‘being short’ (on the spot market); but a person who needs a commodity (or financial instrument) at some future date and does not have it, is also regarded as ‘being short’ (on the spot market). Therefore, in an analytical sense, ‘being long’ means having (or expecting to have) stocks of the asset in question, while ‘being short’ means having (or expecting to have) negative stocks (meaning a need for stocks). The terms are sometimes used as nouns for traders – i.e., a ‘long’ is a person holding a long position and a ‘short’ is a person holding a short position.

A person who is long on the spot market benefits from price increases and loses from price decreases. To protect himself from a fall in price, such a person would hedge by selling in the futures market, i.e., by going short in futures. Thus, such a person is known as a *short hedger since he hedges by going short in futures*.

A person who is short on the spot market benefits from a decrease in price, and loses from an increase in price. To protect himself against rise in price, such a person would hedge by *buying* in the futures market, i.e., by going long in futures. Thus, such a person is known as a *long hedger since he hedges by going long in futures*. The following table summarises the distinction:

Table 3.1: Short hedger vs. long hedger

	Short hedger	Long hedger
Position in spot market	Long	Short
Protection needed against	Price fall	Price rise
Position in futures market	Short	Long