Introduction to Derivatives and Financial Markets

Samyak Zaveri 406
Mansi Mandaliya 412

Project Report

Introduction

Derivatives:

A derivative is a financial and investment instrument whose value is derived from the value of one or more underlying things, which can be commodities, precious metals, currency, bonds, stocks, stock indexes, and so on. Forwards, futures, options, and swaps are the four most common types of derivative instruments.

Hedging:

Hedging is a financial strategy that investors should understand and employ because of the benefits it provides. It protects an individual's finances as an investment from being exposed to a risky circumstance that may result in a loss of value. However, hedging does not guarantee that the investments will not lose value. Rather, if this occurs, the losses will be offset by gains in another investment. Hedging is the equilibrium that allows any sort of investment to succeed. A derivative, or a contract whose value is determined by an underlying asset, is a typical type of hedging. Assume, for example, that an investor purchases stock in a company with the hope that the price of the stock will rise. However, on the contrary, the price plummets and leaves the investor with a loss.

Types of derivatives:

1) **Options:**

Options are simply contracts between two parties that grant holders the right to buy or sell an underlying asset at a certain price within a certain time frame. Calls and puts are the two primary forms of options contracts. Owning a call gives you the right to buy the underlying asset, while owning a put gives you the right to sell it. To distinguish between the two, recall that a call would "call" an asset away, but a put would "place" it to someone else.

Options investors often believe that the price of an asset will rise or fall in the future. In the case of stocks, which we'll concentrate on here, you might select a call option if you believe the stock will rise, or a put option if you believe it will decrease. Options contracts are often fairly short, such as 30, 60, or 90 days, but they can have expiration dates of up to a year. European

options cannot be exercised until the expiry date, whereas American options can be reviewed at any time before the expiry date.

2) Futures:

Futures contracts enable players to lock in a set price and protect themselves against the likelihood of large price movements (up or down) in the future.
Futures example: To avoid an unexpected surge in jet fuel prices, an airline firm could purchase a futures contract committing to buy a fixed amount of jet fuel for delivery in the future at a preset price. A fuel distributor may sell a futures contract to assure a steady market for fuel and to protect themselves from sudden price drops.
Specific terms have been agreed upon by both parties: To purchase (or sell) 1 million gallons of fuel for delivery in 90 days at a cost of $3 per gallon.

Price volatility:

The word "price volatility" refers to a commodity's price variations. The percentage difference in the price of a commodity from day to day is used to calculate volatility. A volatile market is defined by the degree of volatility rather than the level of pricing.

Because pricing is a product of supply and demand, volatility is a result of the market's fundamental supply and demand characteristics. As a result, high levels of volatility reflect unusual characteristics of supply and/or demand.

Natural gas, electricity, and heating oil prices are often more variable than prices for other commodities. One explanation for the volatility of energy prices is that many users have very limited options for substituting alternative fuels when the price of natural gas, for example, varies.

Residential customers typically cannot change their heating system rapidly, and it may not be cost effective in the long run. As a result, whereas consumers may easily replace food goods when relative prices of foodstuffs vary, they do not have that option when it comes to heating their houses.

Volatility is a measure of market price uncertainty. Firms may postpone investment and other decisions or enhance risk management operations when volatility rises. The costs of such activities tend to raise the costs of both supplying and consuming gas.

Perfect hedge:

A perfect hedge refers to a position which an investor undertakes to eliminate the risk of an existing position, or a position which eliminates every market risk from a portfolio. In a bid to be

a perfect hedge, a position must have a 100% inverse correlation to the first position. Thus, the perfect is rare to find. When perfect hedge, as a terminology, is thrown about in finance, it always means a normal hedge as judged by the risk tolerance of the speakers. There's no reason to totally eliminate every risk out of an investment, as neutering risk has a synonymous effect on rewards. Instead, traders and investors seek to establish a probability range where the best and worst outcomes are both acceptable.

Statement 1:

Hedging using Futures can potentially eliminate volatility for any movement in underlying hedged items.

The following statement is true only in the case of a perfect hedge.

About Hedging with futures:

Hedging with futures is a basic protection against moving prices. It would be similar to having basic liability insurance. With futures having this “liability” insurance protects against an unfavorable price change in the cash market by gaining in the futures market. With futures a single selling price is created when the futures position is entered by selling a futures contract. Therefore, the value of the futures hedge depends on how the market moves and how the basis changes. In turn the basis affects the cash price since the futures price +/- the basis equals the cash price.

If the price increases and we have short hedged the item with futures then we can expect a loss potential if future hedge doesn’t cover cash changes. On the contrary, if the price decreases and we have hedged the item with futures then we can expect a gain potential especially when the basis strengthens.

If the price increases and we have Long hedged the item with futures then we can expect a gain potential on the amount of ceiling price. On the contrary, if the price decreases and we have hedged the item with futures then we can expect an Infinite gain minus the premium.

Advantages of Futures Hedging:

Opens the Markets to Investors: Futures contracts can be beneficial to risk-averse investors. Investors are able to participate in marketplaces that they would not have been able to access otherwise.

Stable Margin Requirements: In the futures market, margin requirements for the majority of commodities and currencies are well established. As a result, a trader understands how much margin to put up in a transaction.

No Time Decay Involved: The value of assets drops with time in options, reducing the trader's profitability significantly. This is referred to as time decay. Time decay is not an issue for a futures trader.

High Liquidity: Most futures markets have considerable liquidity, particularly for currencies, indexes, and commonly traded commodities. This enables traders to enter and exit the market whenever they want.

Simple Pricing: Unlike the extremely difficult Black-Scholes Model-based options pricing, futures pricing is quite easy to understand. It's usually based on the cost-of-carry model, under which the futures price is determined by adding the cost of carrying to the spot price of the asset.

Protection Against Price Fluctuations: Forward contracts are used as a hedging mechanism in businesses where prices fluctuate a lot. Farmers, for example, utilise these contracts to protect themselves from the possibility of a reduction in crop prices. Assume a farmer is growing wheat and anticipates harvesting 8,000 bushels of wheat when the crop is ripe. She can sell the entire crop at a fixed price well before the actual harvest, with delivery scheduled for a future date such as five months from the date of agreement, if she is unsure about the pricing at the time of harvest. The transaction offers her protection against any possible fluctuations in currency exchange rates and price drops in the wheat market.

Hedging Against Future Risks: Many people use forward contracts to better control risk. These contracts are frequently used by businesses to mitigate the risk associated with foreign currency conversion.

Disadvantages of Futures Hedging:

No Control Over Future Events: One common drawback of investing in futures trading is that you don't have any control over future events. Natural disasters, unexpected weather conditions, political issues, etc. can completely disrupt the estimated demand-supply equilibrium.

Leverage Issues: High leverage can result in rapid fluctuations of futures prices. The prices can go up and down daily or even within minutes.

Expiration Dates: Future contracts involve a certain expiration date. The contracted prices for the given assets can become less attractive as the expiration date comes nearer. Due to this, sometimes, a futures contract may even expire as a worthless investment.

Statement 2:
Hedging using options can eliminate the downside volatility of the price movement in the underlying asset at an associated cost.

I agree with the above given statement

Reasons:

About Hedging with Options:

Price hedging is also possible with option hedging. It would be equivalent to adding more than just liability insurance in this scenario. The higher the premium for additional insurance, the higher the premium for that insurance. With options, the more security you have against a price shift that isn't in your favor necessitates a greater premium (cost of the option).

The premium cost is equal to the sum of the option's intrinsic and time values. The intrinsic value of an option is the measure of its worth at the moment of acquisition. The option's time value is its worth as the underlying futures contract and option approach maturity. The time value is always zero at the time of expiration, implying that any value at the time of expiration has an intrinsic value.

By establishing a minimum price floor or a maximum price ceiling, options provide protection against a sharp drop in prices. Simultaneously, as prices grow, extra profits are realised. The cost of the premium, on the other hand, will have to be deducted from the profits generated by the higher cash price. A change in basis has a less impact on the options hedge than it does on the futures hedge.

We can expect an unlimited gain less the premium if the price rises and we have hedged the item with Put Options. On the other hand, if the price falls and we hedged the item with Options, we can expect a gain on futures in the amount of the floor price.

If the price increases and we have Long hedged the item with Call Options then we can expect gain on futures in the amount of ceiling price. On the contrary, if the price decreases and we have hedged the item with Options then we can expect an Infinite gain minus the premium.

Advantages of Options Trading:

Cost Efficient:

Options provide a significant amount of leverage. At a considerably lower margin, a trader or investor can have an options position that is equivalent to a stock position. For example, an investor must pay Rs. 16000 to purchase 200 shares of a stock at a price of Rs. 80. However, if he purchased equal-weighted call options, the premium required would be roughly Rs 4000. So we can get a good notion of the cost-effectiveness of various options.

High Return Potential:

Options trading has a considerably better return potential than buying stocks with cash. As a result, if the strike is picked correctly, the option pays the same profit as straightforward stock buying. As we are getting options on lower margin and getting the same profitability the percentage return would be much higher comparatively.

Lower Risk:

Although having options is riskier than owning equities, there are situations when options are used to reduce risk. Options are commonly used to hedge positions. Options risk is predetermined because the maximum loss is limited to the premium paid to purchase the option.

Additional strategies are available:

There are additional options trading methods available in the options market. With the use of call and put options with varied expiries and strike prices, the trades can be combined to form a strategic position.

Disadvantages of options:

Less Liquidity: Some stock options have poor liquidity, making it difficult for a trader to enter and exit the deal.

High Commissions: Trading options is more expensive than trading futures or stocks. However, there are also bargain brokers that allow traders to trade with lesser commissions. However, most full-service brokers demand a greater cost for trading options.

Time Decay: When trading options, time decay is a bad thing. Regardless of underlying movement, the value of your option premium declines by a certain percentage each day.

Non Availability of All Stock Options: There are no options contracts on any of the equities that are listed on exchanges. This makes it harder for a trader to use options methods to hedge his position.

Combined:

Real Life Numerical Example:

A farmer producer wishes to hedge his risk for the wheat he must purchase in the winter against rising prices as well as decreasing prices when attempting to sell the wheat. For either case, the producer can hedge with futures or options. Essentially, he must decide what kind of protection he seeks and which type of hedging will provide him with the most risk protection. For example, if he anticipates a rise in feed prices, he can utilise a put to lock in a cheaper buying price. He can also hedge the wheat in the futures market if he anticipates that futures prices will have fallen by the time he wants to sell it at the current price.

Assume a wholesaler is wanting to purchase wheat in order to sell it in the market. Furthermore, the wholesaler wishes to hedge his risk. The current price of January futures is $797.27, and a call option with a strike price of $800 is $5. He's debating whether to hedge with futures or options. The chart below depicts his option and the outcomes of his hedges if the market falls, stays about the same, or rises.

	Futures Options	Call Options
If at Jan 15th	Buy April. futures $797.27	Buy wheat at $800 (ceiling is $805)
In april. at futures are:		
$765	$32 loss	Options worthless, out of the cost option
$800	$3 gain	Options worthless, out of the cost option
$835	$38 gain	Option has $30 of worth

If the market falls: The futures hedge will lose $32 because the buying price of $797.27 is greater than the selling price of $765. Because the option is now worthless, the producer who is hedging would be out the option's cost. The net purchase price in this case would be the cash price plus the cost of the option.

If the market remains generally stable: A little gain arises when the selling price rises relative to the purchase price. This amount is $3. This means that the net buying price would be the cash price minus the $3 futures market gain. Furthermore, if the producer decided to hedge with options, the option would be worthless, implying that the net buying price would be the cash price plus the cost of the option.

If the market increases: If the market rises, the futures hedge provides the largest rewards when compared to an options hedge. When the lower purchase price and higher selling price are removed from the cash price, a $38 profit is made. This is the total selling price minus the cost of goods sold. With an options hedge, the profit is $35 because the ceiling price is $805 rather than $835. This profit is smaller than the profit from the futures hedging.

If the market rises, the futures hedge outperforms the options hedge in terms of gains. When the lower purchase price and higher selling price are removed from the cash price, a $38 gain is realized. This is the net selling price. With an options hedge, the profit is $35 because the ceiling price is $805 instead of $835. Overall, this profit is smaller than the benefit from the futures hedge.