

FORWARD AND FUTURES

Module 2

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Forward Contracts

Definition

A forward contract is a financial agreement between two parties to buy or sell an asset at a future date for a price agreed upon today. This contract is customizable and is not traded on any exchange, making it an over-the-counter (OTC) agreement.

1. Parties involved:

a) Buyer (Long Position): Commits to purchasing the asset.

b) Seller (Short Position): Commits to selling the asset.

2. Asset and Quantity:

a) The type of asset (commodity, currency, financial instrument).

b) The quantity of the asset to be traded.

3. Price (Forward Price):

a) Agreed upon at the start of the contract.

b) It is the price at which the asset will be bought or sold in the future.

4. Maturity Date:

a) The date when the transaction will be executed.

b) It's the date when the buyer pays and the seller delivers the asset.

Settlement of Forward Contract

The settlement of a forward contract refers to the fulfillment of the agreement between the buyer and seller at the maturity date. It involves the actual exchange of the asset for the agreed-upon price.

Cash Settlement:

- In a cash settlement, no physical exchange of the underlying asset occurs.
- Instead, the parties settle the contract by exchanging the cash equivalent of the contract's value based on the agreed-upon forward price.
- This method is common in financial forward contracts like those for currencies or stock indices.



Future Contracts

01

Definition

A futures contract is a standardized financial agreement to buy or sell an asset at a predetermined price on a specified future date. Unlike forward contracts, futures are traded on organized exchanges, providing liquidity and standardized terms.

02

Contract Specifications

Standardized size and terms set by the exchange. Includes the type of asset, quantity, and contract expiration.

03

Positions

Long Position: Commits to buying the asset.
Short Position: Commits to selling the asset.

04

Clearinghouse

Acts as an intermediary, ensuring the fulfillment of contracts. Reduces counterparty risk by guaranteeing trades.

Futures Contract Specification and Terminologies

Futures contracts, integral to financial markets, exhibit specific features encapsulated in key terminologies.

The contract size, denoting the standardized quantity of the underlying asset, pairs with the type of asset itself, spanning commodities, financial instruments, or indices.

With each contract boasting a set expiration month and a defined tick size representing the minimum price movement, traders navigate the markets with an understanding of tick values, the financial impact of these movements.

Margin requirements, both initial and maintenance, stipulate the capital necessary for entering and maintaining positions.

The settlement method, whether physical delivery or cash settlement, further diversifies trading strategies.

Parties in futures contracts assume either a long or short position, committing to buy or sell the asset. Daily adjustments through marking to market ensure continual evaluation of profits and losses, providing transparency.

The contract's delivery point, last trading day, and availability across various contract months contribute to the comprehensive landscape of futures trading. In practical terms, these specifications and terminologies form the foundation for effective risk management and trading decisions in financial markets.





Arbitrage

Arbitrage is the practice of exploiting price differences of the same or similar assets in different markets to make a profit with little to no risk. The essence of arbitrage is taking advantage of discrepancies in prices by simultaneously buying and selling an asset in different markets to lock in a profit. In efficient markets, opportunities for arbitrage are typically short-lived as market participants quickly act to eliminate price differences. However, the concept of arbitrage plays a significant role in keeping markets efficient by ensuring that prices remain consistent across different platforms or locations

Convergence Relationship between Futures Price and Expected Spot Price:

The convergence relationship is a crucial concept in the context of futures markets, describing the tendency of futures prices to move towards the expected spot price as the delivery or expiration date of the futures contract approaches. This relationship is grounded in the idea that, at the contract's maturity, the futures price should ideally align with the spot price of the underlying asset.

- **No Arbitrage Opportunity:** The convergence relationship is a result of the absence of arbitrage opportunities. If a significant gap exists between the futures price and the expected spot price at expiration, arbitrageurs could exploit the difference, buying in the lower market and selling in the higher, leading to market adjustments.
- **Cost of Carry Model:** The relationship is often explained through the cost of carry model, which considers the costs of holding the underlying asset until delivery. This model includes factors like storage costs, dividends, and interest rates.
- **Arbitrageurs' Role:** Arbitrageurs play a vital role in ensuring convergence. If the futures price deviates from the expected spot price, arbitrageurs enter the market, either buying the cheaper futures or selling the more expensive ones, driving the prices back towards alignment.

Basis

The basis is a fundamental concept in the context of futures markets, representing the difference between the spot price of an underlying asset and the futures price of a corresponding futures contract. Mathematically, $\text{Basis} = \text{Spot Price} - \text{Futures Price}$. A positive basis indicates that the spot price is higher than the futures price, while a negative basis suggests the opposite. Basis is influenced by factors such as supply and demand, storage costs, interest rates, and convenience yields.

Normal Backwardation and Contango: In a state of normal backwardation, where futures prices are lower than the expected future spot prices, the basis is positive. In contango, where futures prices exceed the expected future spot prices, the basis is negative.

Role in Hedging: Basis is crucial for hedgers using futures contracts to mitigate risk. By understanding and monitoring basis movements, hedgers can optimize their hedging strategies, aiming to lock in favorable basis conditions.

Seasonal Influences: Agricultural commodities often experience basis variations due to seasonal factors. For example, the basis for wheat might be influenced by the planting and harvesting seasons.



Basis Risk



Basis risk arises when the basis between the spot and futures prices does not move in the anticipated manner, exposing hedgers to potential losses. It's the risk that the actual basis at the time of the futures contract's expiration differs from the basis expected at the contract's initiation. Basis risk can result from unforeseen changes in market conditions, supply and demand shocks, or disruptions in the normal relationships between spot and futures prices.



Consider a farmer who hedges the future sale of corn by entering into a corn futures contract. If the basis at the contract's expiration is wider (more negative) than expected, the farmer may face a basis risk, leading to a less effective hedge and potentially impacting the overall financial outcome.

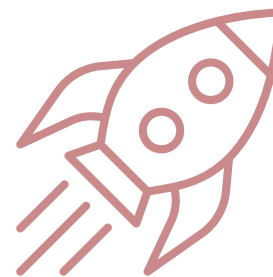
Pricing of Futures Contract



Market Dynamics

Futures prices are influenced by supply and demand dynamics in the market.

Changes in market sentiment, economic conditions, and geopolitical events can impact pricing.



Cost of Carry Model

Pricing often follows the cost of carry model.

Includes factors like interest rates, storage costs, and dividends for financial assets.



Arbitrage Forces

Arbitrageurs play a key role in aligning futures prices with spot prices.

If futures prices deviate, arbitrageurs take advantage, buying low and selling high (or vice versa) to narrow the gap.

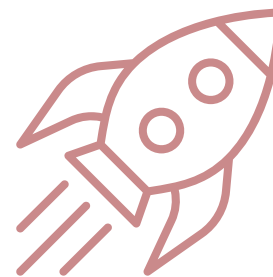
Pricing of Futures Contract



Spot Price and Expected Future Spot Price

Futures prices tend to converge with the expected future spot price as the contract approaches maturity.

The relationship ensures that there are no persistent arbitrage opportunities



Risk Premiums

Futures prices may include risk premiums to compensate investors for taking on future price uncertainty.

Higher perceived risk can lead to higher futures prices.



Interest Rates

Interest rates play a significant role, especially in financial futures.

Higher interest rates can contribute to higher futures prices.

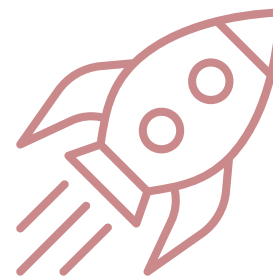
Pricing of Futures Contract



Storage Costs and Convenience Yields

For commodities, storage costs impact pricing.

Convenience yields, representing the benefits of holding the physical asset, also influence futures prices.



Expectations and Speculation

Investor expectations and speculative activities can drive short-term fluctuations in futures prices.

Market participants make decisions based on their predictions of future price movements.



Clearinghouse Mechanism

The role of the clearinghouse in ensuring the integrity of the market and the fulfillment of contracts.

Clearinghouses require participants to meet margin requirements, affecting overall pricing.

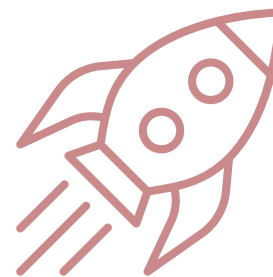
Pricing of Futures Contract



Daily Marking to Market

Futures contracts are subject to daily marking to market, adjusting for daily price movements.

Profits and losses are realized and settled daily.



Contract Specifications

Standardized contract specifications, including contract size and expiration dates, influence pricing.

Exchange rules govern these specifications to maintain market integrity.



Liquidity in the Market

Highly liquid markets generally have more efficient pricing.

Low liquidity can lead to wider bid-ask spreads and potentially less accurate pricing.

Cost of Carry Model

The Cost of Carry Model is a financial model used to determine the theoretical price of a futures contract based on the cost of carrying the underlying asset until the contract's expiration.

Equation:

The theoretical futures price (F) is calculated as the spot price (S) multiplied by the exponential of $[(r + c - y) * t]$, where:

r: Risk-free interest rate.

c: Storage or carrying costs.

y: Dividends or income generated by the asset.

t: Time to expiration in years.



Interpretation of Cost of Carry Model

If the calculated cost of carry is positive, it suggests that the futures price should be higher than the spot price, indicating a potential profit opportunity through arbitrage. Conversely, a negative cost of carry suggests that the futures price should be lower than the spot price.

Assumptions:

- a) Assumes efficient markets with no transaction costs.
- b) Assumes no restrictions on short selling.

Limitations:

- a) Real-world markets may have frictions and costs that the model does not account for.
- b) Behavioral factors and market sentiment can influence prices beyond the model's scope.



Speculation and Arbitrage using Futures



Objective:

Speculation involves taking positions in futures contracts with the primary aim of profiting from anticipated future price movements.



Risk and Reward:

Speculators seek to capitalize on price changes without the intent of taking delivery of the underlying asset.

Leverage is a key feature, allowing speculators to control a large position with a relatively small amount of capital.



Market Impact :

Speculators contribute to market liquidity and price discovery.

Their actions can influence short-term price movements.



Objective:

Arbitrage involves exploiting price discrepancies between related markets or instruments to secure a risk-free profit.



No Net Investment:

In an arbitrage strategy, there is no net investment of capital. Arbitrageurs simultaneously buy and sell assets to benefit from price differentials.



Role in Market Efficiency:

Arbitrage activities contribute to market efficiency by quickly eliminating price disparities.

The process of arbitrage ensures that prices across different markets or related instruments remain in alignment.

Long Hedge

A long hedge is a risk management strategy used by individuals or businesses with exposure to the price volatility of an underlying asset. The goal is to protect against potential price increases.

Those seeking a long hedge typically enter into a futures contract to secure a fixed purchase price for the underlying asset at a future date.

Commonly employed by producers or consumers of commodities to guard against rising prices.

Protects against adverse price movements.

Allows businesses to plan and budget with more certainty.



Short Hedge



Objective

A short hedge is a risk management strategy used to protect against the risk of falling prices for an underlying asset.



Implementation

Those seeking a short hedge typically enter into a futures contract to sell the underlying asset at a fixed price at a future date. Commonly employed by entities with exposure to the price fluctuations of commodities or financial instruments.



Risk Mitigation

Shields against potential losses due to declining prices.

Provides a known selling price, aiding in budgeting and planning.

Cash & Carry Arbitrage

Concept: Cash and carry arbitrage is an investment strategy that seeks to exploit pricing inefficiencies between the cash (spot) market and the futures market for a particular asset.

Components:

- 1. Asset Purchase:** The arbitrageur buys the underlying asset in the cash (spot) market.
- 2. Simultaneous Short Futures Position:** The arbitrageur takes a short position in the futures contract for the same asset.
- 3. Costs of Carry:** The strategy relies on the concept of the costs of carry, which includes storage costs, financing costs (interest), and any dividends or income generated by the asset.
- 4. Expiration:** The arbitrageur holds the asset until the futures contract expires.

Mechanics:

1. Scenario 1 - Overpriced Futures:

If the futures price is higher than the sum of the current spot price and carrying costs, an arbitrageur can profit by buying the asset in the spot market, taking a short position in the futures contract, and holding the asset until the futures contract expires.

2. Scenario 2 - Underpriced Futures:

If the futures price is lower than the sum of the current spot price and carrying costs, an arbitrageur can profit by taking the opposite approach. They go long on the futures contract, sell the asset in the spot market, and invest the proceeds until the futures contract expires.

Reverse Cash and Carry Arbitrage

Concept:

Reverse cash and carry arbitrage is an investment strategy that aims to exploit pricing inefficiencies between the cash (spot) market and the futures market for a particular asset, but in the opposite direction compared to traditional cash and carry arbitrage.

Components:

Asset Short Sale:

The investor takes a short position in the underlying asset in the cash (spot) market.

Simultaneous Long Futures Position:

The investor takes a long position in the corresponding futures contract for the same asset.

Costs of Carry:

The strategy relies on the costs of carry, which includes potential income from short selling, financing costs (interest), and any dividends or income generated by the asset.

Expiration:

The investor holds the futures contract until expiration.

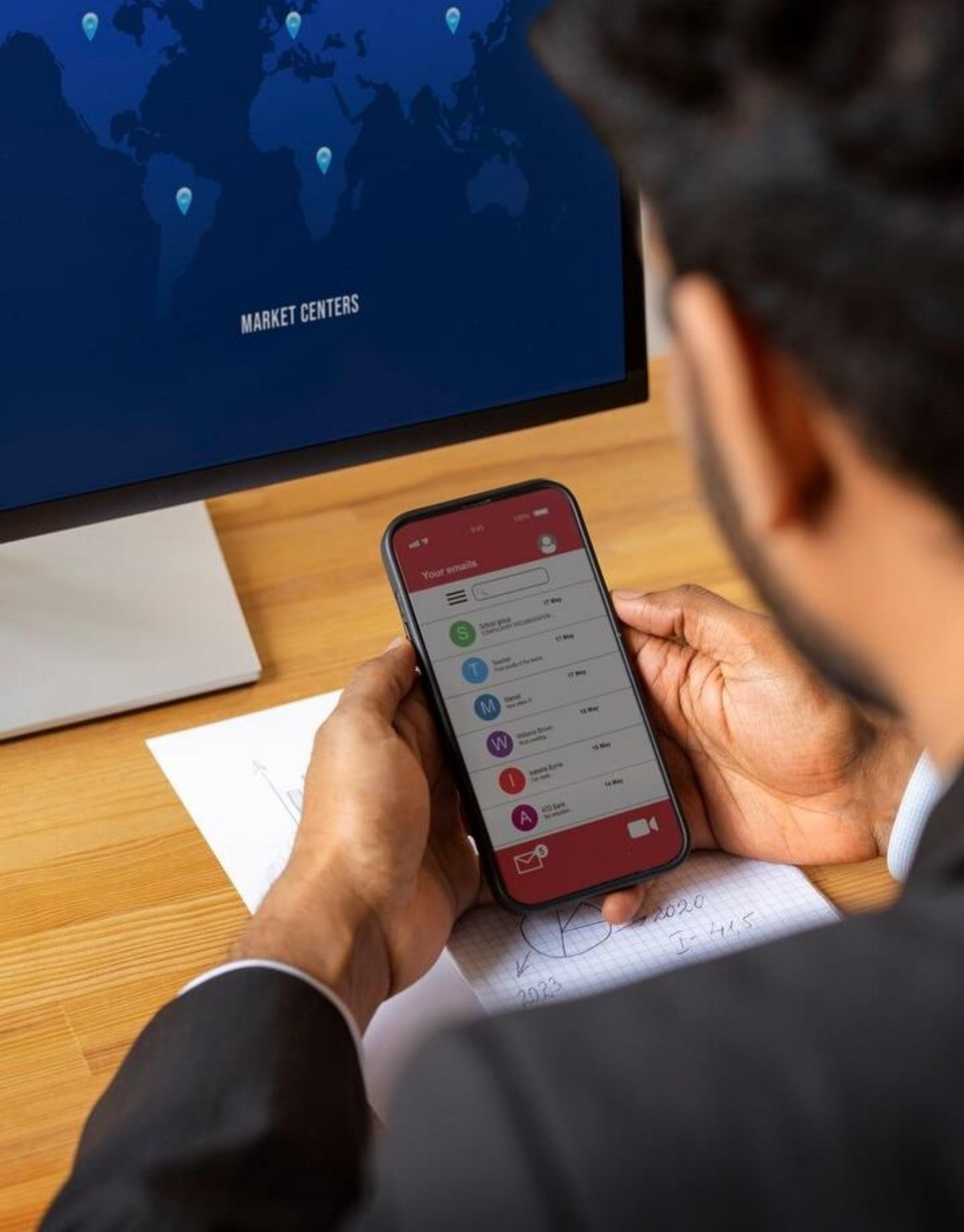
Mechanics:

Scenario 1 - Overpriced Cash Market:

If the cash market price is higher than the sum of the futures price and carrying costs, an investor can profit by short selling the asset in the cash market, going long on the futures contract, and holding the futures contract until expiration.

Scenario 2 - Underpriced Cash Market:

If the cash market price is lower than the sum of the futures price and carrying costs, an investor can profit by taking the opposite approach. They go long on the asset in the cash market, short sell the corresponding futures contract, and hold the futures contract until expiration.



Payoff Chart

Payoff charts and diagrams are visual representations that help illustrate the potential profit or loss from holding a futures contract at various prices of the underlying asset upon expiration. Below are examples of payoff charts for both long and short futures positions:

A long futures Position

A long futures position involves buying a futures contract, anticipating a rise in the price of the underlying asset.

Short Futures Position

A short futures position involves selling a futures contract, anticipating a decline in the price of the underlying asset.

Combined Payoff Chart

A combined payoff chart illustrates the net payoff when an investor holds both a long and a short futures position.

Perfect Hedge

A perfect hedge is a risk management strategy that eliminates all potential price risk, resulting in no net gain or loss. It involves taking an offsetting position in a related security or derivative to neutralize the impact of price movements on the original asset

Characteristics:

- The value of the hedge perfectly offsets any adverse price movement in the underlying asset.
- The investor or business is protected from any financial loss but also gives up the opportunity for gains.

Purpose:

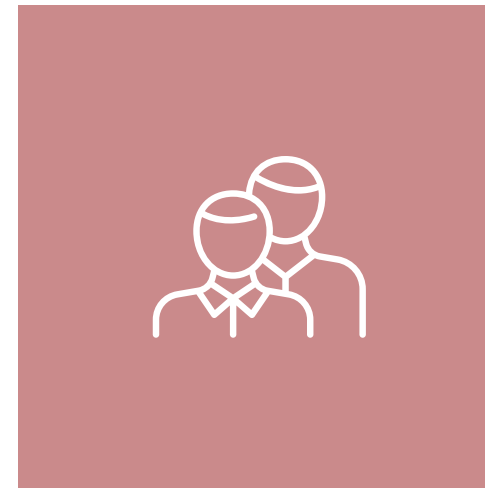
- To completely eliminate exposure to price fluctuations, ensuring a known financial outcome.



Imperfect Hedge

Definition

An imperfect hedge is a risk management strategy that aims to reduce, but not eliminate, the impact of price movements on the underlying asset. It involves taking a position in a related security or derivative that only partially offsets the risk of the original asset.



Purpose:

To manage risk while retaining some flexibility for potential gains or to address specific risks that cannot be perfectly hedged.

Characteristics

The hedge does not perfectly offset price movements, resulting in the potential for both gains and losses.

Provides a degree of protection while allowing for some exposure to market fluctuations.



Difference

A perfect hedge offers no flexibility as the outcome is predetermined.

An imperfect hedge allows for flexibility and potential gains in addition to risk mitigation.

Stock & Index Futures

Definition of Stock Futures

Stock futures are financial contracts that obligate the buyer to purchase or the seller to sell a specified quantity of shares of a particular stock at a predetermined price on a future date. These contracts derive their value from the price movements of the underlying stock.

Definition of Index Futures

Index futures are financial contracts based on the performance of a stock market index. These futures contracts allow investors to speculate on or hedge against the overall movement of the stock market without buying or selling individual stocks.

Key Differences

Stock futures are tied to individual stocks, exposing traders to company-specific risk. In contrast, index futures, linked to stock market indices, offer diversification across multiple companies, exposing investors to overall market risk. This distinction is crucial for those choosing between specific stock exposure and a more diversified strategy using index futures.

Purpose of Stock Futures

- Stock futures are used for speculation, hedging, and portfolio management.
- Investors can hedge against potential price fluctuations or gain exposure to the stock market without owning the actual shares.

Purpose of Index Futures

- Index futures are used for hedging against market risk, speculating on market movements, and managing overall portfolio risk.
- Investors can gain exposure to the entire market or hedge against the risk of their portfolio.

Futures Contracts on Indices

Underlying Asset: Stock market indices (e.g., S&P 500, NASDAQ).

Diversification: Represents a basket of stocks, reducing individual company risk.



Liquidity: Typically more liquid than individual stock futures.

Contract Size: Standardized value tied to the level of the index.

Other Must Know facts 'bout Future contracts on Indices

Pricing:

- Influenced by the movements of the underlying index.
- Calculated based on the future expected value of the index.

Hedging:

- Investors can hedge against overall market risk.
- Useful for portfolio managers to mitigate the impact of market downturns.

Speculation:

- Traders can speculate on the future direction of the overall market.
- Provides a way to gain exposure to broad market movements.

Arbitrage:

- Arbitrageurs may exploit price differences between index futures and the underlying stocks in the index.
- Helps maintain price efficiency in the market.

Futures Contracts on Individual Stocks:

Features:

Underlying Asset: Specific individual stocks (e.g., Apple, Google).

Company-Specific Risk: Exposure to the performance of the selected company.

Specifications:

Contract Size: Standardized number of shares per contract.

Expiration Date: Date on which the contract matures.

Price Quotation: Quoted in terms of the stock's price per share.



Pricing:

Influenced by the movements of the underlying stock.
Calculated based on the future expected value of the stock.

Hedging:

Investors can hedge against price movements in a specific stock.
Commonly used by companies to hedge against their own stock price fluctuations.

Thanks!