

**Forward and Futures Markets**

Peter Ritchken  
Kenneth Walter Haber Professor of Finance  
Case Western Reserve University  
Cleveland, Ohio, 44106

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**Class Objectives**

- Buying Assets and Selling Assets Short.
- Financial leverage and Profit Payout Graphs.
- Forward contracts
- Problems with Forward Contracts.
- Futures Contracts.
- Marking to Market, Clearing Houses and Margin requirements
- Profit payout graphs for forwards and futures.
- To explain the difference between forward and futures.

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**Class Objectives**

- To understand some of the current issues that exchanges are dealing with.
- Forward markets are important. The internet is changing trading behavior.

AFTER THE LECTURE  
-You will have a good overview of  
Forward and Futures markets

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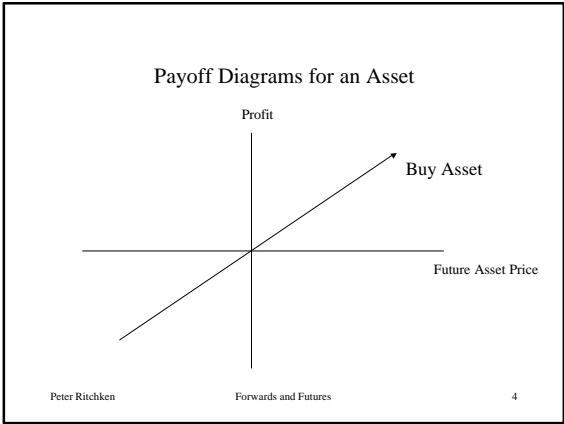
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### Short Sales

- Borrow the Asset from A ( A is a securities lender)
- Sell the borrowed asset to B
- At some future date, you buy the asset from C, and return it to A. (You “cover” your position.)

Example 1

- Short stock at \$100, then cover the position six months later at \$75.
  - Profit =  $100 - 75 = \$25$ .

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### Short Sales

- If the stock sold short pays a dividend, the short seller is responsible for it.

Example 2

- Short stock at \$100, then cover the position six months later at \$75. Dividend of size \$3.0 paid in the interim.
  - The firm pays the dividend to B;
  - The short seller has to pay an equivalent dividend to A;
  - Profit on short sale =  $100 - (75 + 3) = \$22$ .

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Short Sale: More rights exist to the asset than the number of outstanding units.

- From the firm's point of view, B owns the stock, and B gets the dividend.
- From A's perspective: A still owns the stock and A should also get a dividend. You, as the short seller, are responsible for this payment.
- When you cover your position, buy from C, and returning the stock to A, C has no further claims on dividends, and from the firm's perspective, A now will get future dividends.

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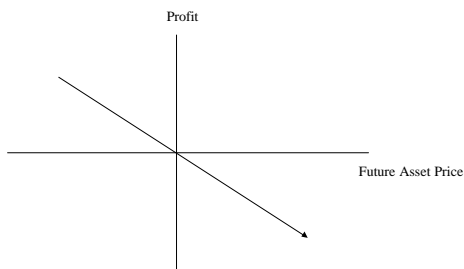
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### Payoff Diagrams for a Short Sale



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### Short Sales: Market Restrictions

- When you receive the proceeds from a short sale, the funds are invested in fixed income securities. The interest may be split between you and the security lender, A.
- For stocks in the US, short sellers must leave the proceeds of the short sale with their broker. In addition, the short seller must post an initial margin equal to 50% of the selling price of the stock. The short seller gets interest on the margin account, but does not get any interest on the proceeds.

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### Risks to Short Sales

- May be difficult to locate traders who are willing to lend the asset.
- If the lender of the asset no longer wants to loan the asset out, and no other sources for the asset can be found, then the short seller may be forced to cover an existing position.
- If the supply is monopolized, then it may be difficult for the short seller to buy a stock to cover the position. This is called a short squeeze.
- Can only sell a stock short when the last price change was an up-tick.

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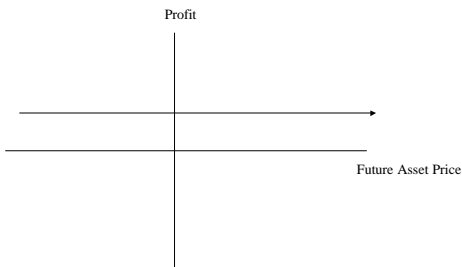
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### Payoff Diagrams for a Money Fund



You receive a fixed amount of interest which has nothing to do with the future asset price.

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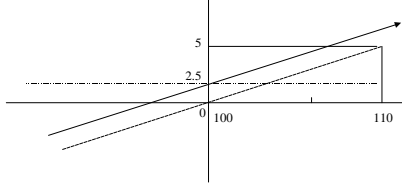
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### Simple Positions in Assets and Cash

- Profit Diagrams with 50% in Assets and 50% in Cash
- Buy 0.5 shares and \$50 in money fund at 5% per year.




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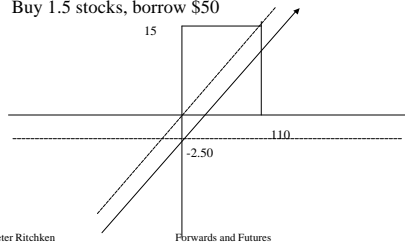
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### Financial Leverage

- 150% Asset – 50% Money Fund.
- Buy 1.5 stocks, borrow \$50




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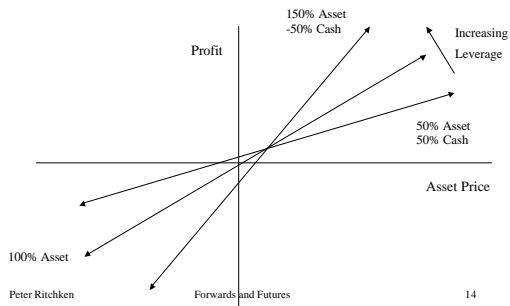
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### Leverage




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### Long Forward Contracts

- Lock in at date 0, the purchase price of 1 unit for delivery at date T.
- The Price is  $FO(0)$
- At date T, you purchase the unit for  $FO(0)$ , regardless of the spot price,  $S(T)$ .
- You are LONG the forward contract.

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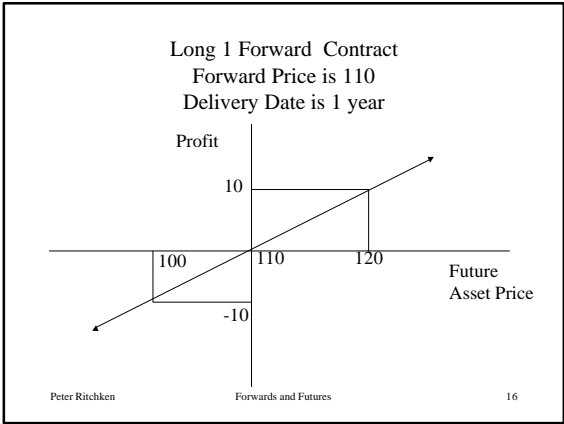
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Short Forward Contracts

- Lock in the selling price of 1 unit for delivery at date T.
- The Sales price is  $FO(0)$ .
- At date T, you have the obligation to sell 1 unit for  $FO(0)$ , regardless of the spot price,  $S(T)$ .

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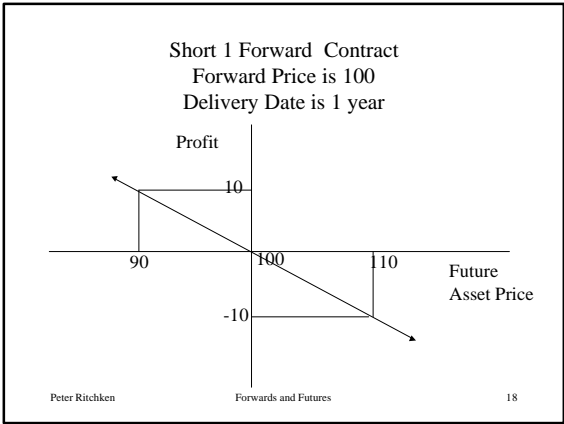
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### Example

- $T = 1$  year;  $S(0) = 100$ ;  $FO(0) = 110$
- The long has the obligation to buy at 110.
- The short has the obligation to sell at 110.
- Say at the end of one year  $S(T) = 104$ .
- The long would prefer not have the obligation.
- The long would pay the short up to \$6.0 to get rid of the obligation.

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### Forward Contracts

- Agreements between two parties.
- Settle contract at a future date.
- Default risk is present. (Can you trust your counterparty?)
- Value of the contract at date 0 is:  $V(0) = 0$
- Value of the contract at date T is:  $V(T) = S(T) - FO(0)$

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### Example

- $S(0) = 100$ ;  $T = 3$ ;  $FO(0) = 150$
- $S(1) = 300$ : The long worries about creditworthiness!
- $S(2) = 400$ : The long worries more!
- $S(3) = 600$ : What is the value of the forward?
  
- The long (short) may request the short (long) pays the long (short) as the price moves in the long's (short's) direction. Such terms have to be agreed upon at date 0.

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### Value of a Forward Contract

- At date 0 the forward price is negotiated so that the value, is 0. ( $V(0)=0$ )
- At date T, the value of the position to the long is  
$$V(T) = S(T) - FO(0)$$

This could be positive or negative.

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### Problems with Forward Contracts

- Credit Risk
  - Increases with the Maturity Date
  - You have to know who you are dealing with.
- Liquidity
  - Customized contracts. Difficult to get out of.
- Agreement Terms
  - Need to be negotiated.

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### Futures Contracts

- Is an agreement to BUY or SELL an asset at a certain time in the future for a predetermined price.
- The FUTURES PRICE is the price at which you agree to buy or sell
- It is determined by supply and demand on the floor of the exchange.

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## Futures Contracts

- Completely Standardized Contracts
  - Quantity
  - Quality
  - Deliverable Location
  - Deliverable Times

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## Example

- January: A trader enters into a long futures contract on COMEX to purchase 100 oz. of gold at \$420 in June.
- In June the price of gold is \$430 per oz.
- What is the trader's profit?

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## Marking to Market

- Payoff is received in daily installments
- Credit risk is reduced to One Day Risk.
- The path of prices matters.
- Assume price increases, then decreases. The long reinvests the winnings for a long time period, then finances the losses for a short time period. This path is more desirable to the long than a path where prices drop then increase to the same terminal price.

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Contract is Marked to Market Daily

| Day | Futures Price | Profit for Long |
|-----|---------------|-----------------|
| 0   | 104           | -               |
| 1   | 105           | +1              |
| 2   | 107           | +2              |
| 3   | 102           | -5              |
| 4   | 108           | +6              |
|     |               | +4              |

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- Credit Risk Reduction Features
- Credit Risk is reduced to One Day Risk.
  - Credit Risk is reduced by a Clearinghouse.
  - Credit Risk is reduced by Margin Requirements.
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- The Clearinghouse.
- When a trade is executed between two parties, A is long and B is short, the clearinghouse steps in and becomes the
    - seller for buyer, A
    - buyer for the seller, B
  - The overall risk exposure of the CH is:
    - No price risk exposure
    - There is credit risk exposure.
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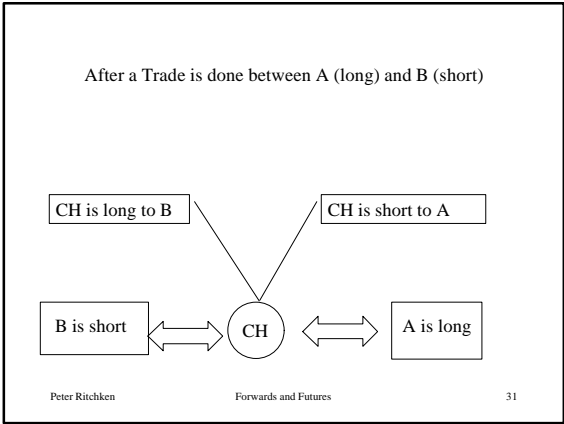
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- ### Risk Reduction Features
- CH requires Margin or “Good Faith Money”
  - Typically this amount should be related to a one day move.
  - The more volatile prices, the greater the margin.
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- ### Advantages of CH
- Buyers and Sellers do not need to know each other.
  - CH is well capitalized. Traders trust CH.
  - Every day members of the CH must bring funds up to clearing margin levels.
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### Closing a Futures Position

- Involves entering into an offsetting position.
- Most contracts are closed out before expiration.
- A is long; B is short.
  - A offsets by going short.
  - C takes the other side (ie C is long)The CH is long for B and short for C.

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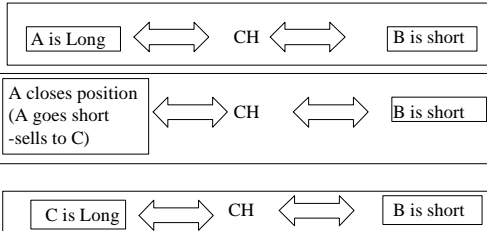
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### A closes out a Position



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### Some Terminology

- Open Interest - The total number of contracts outstanding.
- Equals the number of long positions or the number of short positions.
- Volume of trading- the number of trades done in one day.
- Settlement price- the price just before the final bell each day. It is used for the marking to market process.

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### Questions

- What happens to open interest when a trade is completed?
- Can the volume of trading in a day exceed open interest?

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### Trading Futures Contracts

- There are several types of orders
  - Market Order ( fill at market price)
  - Limit Order (fill at a specific price)
  - Stop Order ( becomes a market order if a price is penetrated)
- Trading at the CBOT is conducted in trading pits.
  - Floor Traders and
  - Professional Traders ( Position Traders, Day Traders, Scalpers)

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### Exchange Trading

- **Prices determined by open outcry auction.**
  - Noisy
  - Hand Signals
- **Once a deal is struck**
  - # Contracts
  - Type of Contract
  - Firm on Other Side
  - Badge number of trader on other side
  - Time Block for trade

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### Delivery Process

- **Position Day**
  - The CH is notified by the short position.
  - CH matches seller to a buyer.
- **Notice Day**
  - Firm representing the seller sends an invoice to the CH and to the firm representing the buyer.
- **Delivery Day**
  - Seller receives a check from the buyers clearing firm.
  - Buyer gets a warehouse receipt.

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### Margin Rules

- **Initial Margin**
  - This is the initial deposit. Approximately equal to the maximum price move in a day. Typically less than 5% of the value of the underlying
- **Maintenance Margin**
  - Typically about 75% of Initial Margin.
  - Margin calls are issued when account falls below this level.
- **Variation Margin**
  - The magnitude of funds required to bring account up to Initial Margin.

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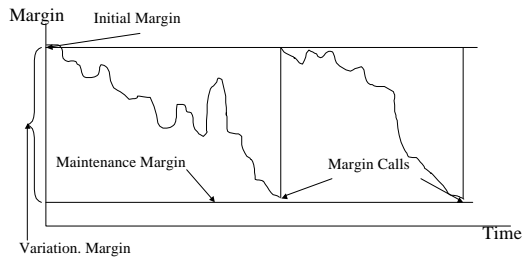
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### Margin Calls



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### Margin (continued)

- Usually you deposit securities into a margin account.
- You keep the interest on the funds in the account.

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### Other Default Risk Reduction Features

- Daily Price Limits
- Circuit Breakers

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### Example: Corn Futures

- Trading Unit is 5000 bushels of corn.
- Can deliver #2 yellow corn, #1 yellow corn at 0.5 cent premium, or #3 yellow corn at 1.25 cent discount.
- Price is quoted in cents and 1/4 cents per bushel. Each tick size is \$12.50
- Months: Dec, March, May, July, Sept.
- Trading Hours: 9.30-1:15 ( Chicago Time)

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Example: Corn Futures

- Last Trading Day: 7 business days before the end of the month.
- Delivery Date: Any business date in the month
- Locations: Exchange Approved Elevators in Chicago, Burns Harbor ( Indiana). 4cent discount at St. Louis (Missouri), or in Toledo ( Ohio)

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Example: Light Sweet Crude Oil Futures on NYMEX.

- Trading Unit is 1000 barrels( 42,000 gallons)
- Can deliver specific domestic crudes with 0.42% sulphur by weight or less, not less than 37 API gravity nor more than 42 API gravity.
  - West Texas Intermediate, Low Sweet mix, New Mexican Sweet, North Texas Sweet, Oklahoma Sweet, South Texas Sweet.
  - UK Brent and forties, Norwegian Oseberg Blend for which sellers will receive a 30c per barrel discount.
  - Nigerian Bonny Light and Columbian Cusiana are delivered at 15c premium
  - Nigerian Qua is delivered at a 5c premium.

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Light Sweet Crude Oil Futures on NYMEX

- Price is quoted in cents per barrel. Each tick size is \$10
- Months: next 30 consecutive months plus others initially listed with 3, 4, 5, 6, and 7 year original maturities.
- Trading Hours: 9.45am to 3.10pm for the open outcry and after trading hours 4pm to 9am (Monday through Thursday) and 7pm to 9am (Sunday)

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**Light Sweet Crude Oil Futures on NYMEX**

- Last Trading Day: Third business day prior to the 25<sup>th</sup> day of the month preceding the contract month.
- Delivery: The contracts delivery point is Cushing, Oklahoma, the center of spot market trading in the US and which is also accessible to the international spot market by pipelines.
- All deliveries must be completed by the last day of the delivery month.

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**Nymex Futures**

- Henry Hub Natural Gas Futures Contract
- Heating Oil
- California/Oregon Border Electricity
- Central Appalachian Coal
- Palo Verde Electricity

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**Forwards    versus    Futures**

|   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Negotiable Size, Delivery Date, Delivery Location , Quality</li> <li>• Price negotiated directly.</li> <li>• Cash Flows are lump sum at expiration.</li> </ul> | <ul style="list-style-type: none"> <li>• Standard Size, Delivery Period, Locations, and Quality.</li> <li>• Price determined by open outcry in an exchange.</li> <li>• Cash flows are daily.</li> </ul> |
|---|---|

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Forwards versus Futures

- No intermediary.
- Security deposits are negotiated.
- Contracts often held to term.
- Self Regulated.
- Clearing House is an intermediary.
- Margin rules exist.
- Contracts typically are offset prior to expiration.
- Regulated by agencies.

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