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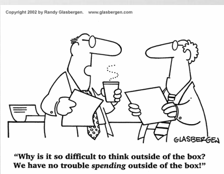
Mechanics of Futures Markets

Do they check the breaks as well as do a tune up?



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Futures Contracts

- **Available on a wide range of underlying**
  - www.cbot.com
  - www.nymex.com
- **Exchange traded**
- **Specifications need to be defined:**
  - What can be delivered,
  - Where it can be delivered, &
  - When it can be delivered
- **Settled daily**

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Margins

- **A margin is cash or marketable securities deposited by an investor with his or her broker**
- **The balance in the margin account is adjusted to reflect daily settlement**
- **Margins minimize the possibility of a loss through a default on a contract**

Example of a Futures Trade

- **An investor takes a *long* position in 4 April gold futures contracts on January 12**
  - contract size is 100 oz.
  - futures price is US$620.00
  - margin requirement is US$2,700/contract (US$10,800 in total)
  - maintenance margin is US$2,000/contract (US$8,000 in total)

A Possible Outcome

Day	Futures Price (US$)	Daily Gain (Loss) (US$)	Cumulative Gain (Loss) (US$)	Margin Account Balance (US$)	Margin Call (US$)
	620.00			10,800	
11-Jan	625.00	2000	2000	12,800	0
:	:	:	:	:	:
19-Jan	612.50				
:	:	:	:	:	. < 8,000
21-Jan	605.40				
:	:	:	:	:	:
26-Jan	617.30				

Other Key Points About Futures

- **They are settled daily**
- **Closing out a futures position involves entering into an offsetting trade**
  - (reversing the position)
- **Most contracts are closed out before maturity**

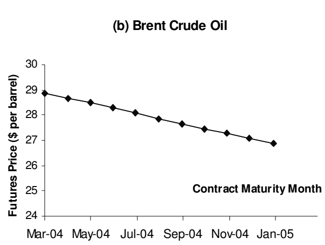
Collateralization in OTC Markets

- **It is becoming increasingly common for contracts to be collateralized in OTC markets**
- **They are then similar to futures contracts in that they are settled regularly**
  - (e.g. every day or every week)

Futures Prices for Gold: Prices Increase with Maturity

Expiration	Opening	High	Low	Closing	Settle	Net Change
7-Jan				612.1	612.1	0.2
7-Feb	612	617.1	609.9	612.1	613.6	-0.1
7-Mar	613.1	617.7	613.1	617.7	616.6	-0.1
7-Apr	616.8	623.2	616	618.4	619.7	Unch
7-Jun	629.1	629.1	625.6	625.6	625.6	Unch
7-Aug				631.4	631.4	Unch
7-Oct				637.2	637.2	0.1
7-Dec	640.2	644.2	639.7	642.5	642.9	0.2
8-Feb				648.4	648.4	0.3
8-Dec				676.2	676.2	0.6
9-Dec				709	709	0.7
10-Jun				725.9	725.9	0.9
10-Dec				742.9	742.9	1.2

Futures Prices for Oil on February 4, 2004: Prices Decrease with Maturity



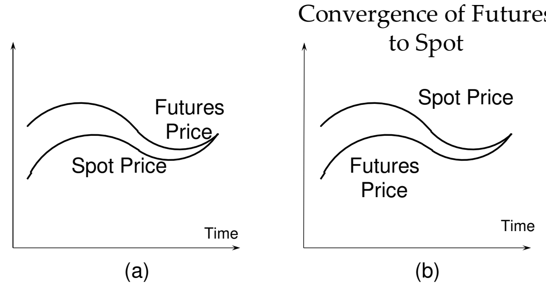
Delivery

- **If a futures contract is not closed out before maturity, it is usually settled by delivering the assets underlying the contract.**
- **When there are alternatives about what is delivered, where it is delivered, and when it is delivered, the party with the short position chooses.**
- **A few contracts (for example, those on stock indices and Eurodollars) are settled in cash**

Some Terminology

- **Open interest: the total number of contracts outstanding**
  - equal to number of long positions or number of short positions
- **Settlement price: the price just before the final bell each day**
  - used for the daily settlement process
- **Volume of trading: the number of trades in 1 day**

Convergence of Futures to Spot



Questions

- **When a new trade is completed what are the possible effects on the open interest?**
- **Can the volume of trading in a day be greater than the open interest?**

Regulation of Futures

- **Regulation is designed to protect the public interest**
- **Regulators try to prevent questionable trading practices by either individuals on the floor of the exchange or outside groups**

Accounting & Tax

- **Ideally hedging profits (losses) should be recognized at the same time as the losses (profits) on the item being hedged**
- **Ideally profits and losses from speculation should be recognized on a mark-to-market basis**
- **Roughly speaking, this is what the accounting and tax treatment of futures in the U.S.and many other countries attempts to achieve**

Forward Contracts vs Futures Contracts

FORWARDS	FUTURES

Foreign Exchange Quotes

- **Futures exchange rates are quoted as the number of USD per unit of the foreign currency**
- **Forward exchange rates are quoted in the same way as spot exchange rates. This means that GBP, EUR, AUD, and NZD are quoted as USD per unit of foreign currency.**
  - Other currencies (e.g., CAD and JPY) are quoted as units of the foreign currency per USD.

Hedging Strategies Using Futures

Ah, but how high is this hedge

Long & Short Hedges

- **A long futures hedge is appropriate when you know you will purchase an asset in the future and want to lock in the price**
- **A short futures hedge is appropriate when you know you will sell an asset in the future & want to lock in the price**

Arguments in Favor of Hedging

Companies should focus on the main business they are in and take steps to minimize risks arising from interest rates, exchange rates, and other market variables

Arguments against Hedging

- **Shareholders are usually well diversified and can make their own hedging decisions**
- **It may increase risk to hedge when competitors do not**
- **Explaining a situation where there is a loss on the hedge and a gain on the underlying can be difficult**

Basis Risk

- **Basis is the difference between spot & futures**
- **Basis risk arises because of the uncertainty about the basis when the hedge is closed out**

Long Hedge

- **Suppose that**
  - F_1 : Initial Futures Price
  - F_2 : Final Futures Price
  - S_2 : Final Asset Price
- **You hedge the future purchase of an asset by entering into a long futures contract**
- **Cost of Asset=$S_2 - (F_2 - F_1) = F_1 +$ Basis**

Short Hedge

- **Suppose that**
  - F_1 : Initial Futures Price
  - F_2 : Final Futures Price
  - S_2 : Final Asset Price
- **You hedge the future sale of an asset by entering into a short futures contract**
- **Price Realized=$S_2 + (F_1 - F_2) = F_1 +$ Basis**

Question:

- **A U.S company will receive $75 million Yen in July**
- **CME contracts have delivery in March, June, September and December**
- **One contract for $12.5 million yen**
  - Should the company go short or long, and which contract?
- **Let us assume the future price today is .89 cents per yen and the spot and futures price at closeout are .83 and .835 respectively**
  - What is the gain in the futures position?
  - What is the basis?
  - What does the company receive in dollars?

Choice of Contract

- **Choose a delivery month that is as close as possible to, but later than, the end of the life of the hedge**
- **When there is no futures contract on the asset being hedged, choose the contract whose futures price is most highly correlated with the asset price. This is known as cross hedging.**

Optimal Hedge Ratio

Proportion of the exposure that should optimally be hedged is

$$\rho \frac{\sigma_S}{\sigma_F}$$

where

σ_S is the standard deviation of ΔS, the change in the spot price during the hedging period,

σ_F is the standard deviation of ΔF, the change in the futures price during the hedging period

ρ is the coefficient of correlation between ΔS and ΔF.

Question

- **Initially we have assumed that this is one.**
- **Let us assume we are going to buy 1 million gallons of jet fuel in three months**
  - Let us calculate the standard deviation in spot price
- **We will hedge with heating oil**
  - Let us calculate the standard deviation in the futures price
  - Let us also calculate the correlation
- **One heating oil futures contracts is on 42,000 barrels**
  - How many contracts should the company go long?

Hedging Using Index Futures

To hedge the risk in a portfolio the number of contracts that should be shorted is

$$\beta \frac{P}{A}$$

where P is the value of the portfolio, β is its beta, and A is the value of the assets underlying one futures contract

Reasons for Hedging an Equity Portfolio

- **Desire to be out of the market for a short period of time.**
  - (Hedging may be cheaper than selling the portfolio and buying it back.)
- **Desire to hedge systematic risk**
  - (Appropriate when you feel that you have picked stocks that will outpeform the market.)

Example

Value of S&P 500 is 1,312.33
Value of Portfolio is $5 million
Beta of portfolio is 1.3

What position in futures contracts on the S&P 500 is necessary to hedge the portfolio (Size of contract 250)?

What is the gain to each position if the index is 1,212 in one month and the current futures contract is 1315 with a RFR of 3%?

Changing Beta

- **What position is necessary to reduce the beta of the portfolio to 0.75?**
- **What position is necessary to increase the beta of the portfolio to 2.0?**

Hedging Price of an Individual Stock

- **Similar to hedging a portfolio**
- **Does not work as well because only the systematic risk is hedged**
- **The unsystematic risk that is unique to the stock is not hedged**

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Why Hedge Equity Returns

- May want to be out of the market for a while. Hedging avoids the costs of selling and repurchasing the portfolio
- Suppose stocks in your portfolio have an average beta of 1.0, but you feel they have been chosen well and will outperform the market in both good and bad times.
- Hedging ensures that the return you earn is the risk-free return plus the excess return of your portfolio over the market.

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Rolling The Hedge Forward

- We can use a series of futures contracts to increase the life of a hedge
- Each time we switch from 1 futures contract to another we incur a type of basis risk
- We will get to this….

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Tax and Accounting Treatment

- FASB Statement No. 52, 80 ,133
- Does the contract qualify as a hedge? Changes when the gain or loss is realized
- Generally, futures contracts are treated as if they are closed out on the last day of the year
- Typically treated as capital gains
- If it is a hedge, then it is ordinary income