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# ECN 135 Lecture 11

## Money, Banks & Financial Institutions

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## Plan for today

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- We covered only LTCM on lecture 10, today we will cover leftovers of lecture 10 (i.e., Chapter 13 & examples) (see slides 8 - 18)
- Options & Futures & Swaps
- Swaps + an example 1988 UK
- Hidden Markets Linkages: how securitization (and hedging) affect yield curves (1994 case: a link with Mortgage market) →
- All markets are united/linked

## LTCM Bailout as an example of Agency Problem

- From the numbers of offers by Buffett (3) & consortium (14) we know that consortium members were afraid that agency conflict will make LTCM liquidation value low (then, their return on capital (their loan to LTCM) is low)
- The only case in which W. Buffett's return on capital is higher than for consortium is if his expectations of LTCM liquidation value were higher
- We calculated that
$$L = \min(\text{LTCM liquidation value}) = \$5\text{bln}$$
From \$0.25 billion + 5%  $L < 10\%$   $L \rightarrow L > = \$5\text{bln}$

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LTCM lessons for the possibilities of regulating hedge funds.

1. Main result: Information about the fund's open positions can affect the value of this positions, especially when the fund is short of cash. Regulations requiring to provide such information could be beneficial, BUT they have CONSIDERABLE costs.

Cost and benefit analysis of possible regulations has to be done carefully.

2. Fed rescue of LTCM and who could be a global CB. Could there be a global CB and if it could, whether the world should have one.

3. Who have paid for the LTCM bailout? Still unclear. The burden was shared between the banks participated in the bailout, taxpayers and LTCM partners.

## LTCM: Why Agency Problem?

- Let  $L = \$5\text{bln}$  and  $Z = \$3.6\text{bln}$
- Then  $r^{\text{cons}} = 25\%$  from  
 $(1+r^{\text{cons}})\$3.6 \geq 0.9 \times \$5 \rightarrow r^{\text{cons}} \geq 0.9/3.6 = 0.25$
- $0.90 \times X = (1+r^{\text{cons}}) \times Z$
- Then, Buffett  $r^{\text{buffett}} \geq r^{\text{cons}} > 0.25$
- $0.95 \times Y = (1+r^{\text{buffett}})(0.25+Z) > (1+r^{\text{cons}})(0.25+Z) = (1+r^{\text{cons}})0.25 + 0.9 \times X$  and at  $X=5 \rightarrow$
- $0.95 \times Y - 0.95 \times X \geq 0.25 r^{\text{cons}}$   
 $Y - X \geq (0.25 \times 0.25) / 0.95 = 0.0657\text{bln} = 67\text{mln}$

# Consortium returns

- Losses due to consortium member banks decline in stock prices (public / market opinion)
- Pure return on investment:
- Let  $X=5$  and  $Z<1$  (actual cash needed) then

$r^{\text{cons}} > 350\%$  (in less than 1.5 year)

Question: Were market participants rational when they were selling the stocks of consortium members?

Answer: Yes and No: Yes (investors signal their concerns) & No (no actual reasons for worrying about unsafe Wall Street practices, but ... who knows?)

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Question: Were markets rational?

Answer: Yes and No:

No, there was no reason to worry

Yes, markets are always rational – by definition

From consortium member banks decline → markets signaled that they are disapproval of “excessive” risk taking by the hedge funds & by banks’ participation / lending to hedge funds

But: markets have known that LTCM partners (and Buffett) evaluated LTCM liquidation value at minimum of \$5bln. Cash loans of \$3.6bln were, therefore, fully collateralized

Did Fed bailout made the markets more efficient? Likely, yes, but nobody knows for sure.

## Unwinding LTCM positions: short

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- Rumor: Gold: LTCM needs to cover short position of 100 tonnes of gold
- LTCM will need gold → gold market
- price ↑ and LTCM liquidation value ↓
- Agency Conflict because Goldman Sachs interests as consortium member & its interests as financial intermediary & interests of individual Goldman Sachs trades can be different

## Unwinding LTCM positions: long

- Assume LTCM is long \$10 bln French Government bonds
  - A. The head of Goldman Sachs John Corzine instructs his traders to sell the bonds short (anticipating drop in their prices)
  - B. Since A. is a bet on market panic, Goldman trader will leak the news to reporters (after he sells the bonds short)
- Result: French bond price ↓ and LTCM liquidation value ↓
- When positions are huge (and their liquidation can move markets) unwinding is difficult. → Secrecy is essential & justifiable
- LTCM unwinding & Rumors: Dutch mortgages rumors exaggerated LTCM holdings 10 times, and in other assets 2-3 times. → Sometimes, being huge (and thus, being able to move Markets) is a disadvantage

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### LTCM Marks a New Era of Technical Trading

LTCM manifests Global Capital Markets (GCM) regulatory problems

Should Hedge Funds be regulated? How?

Could Hedge Funds be regulated?

Fed rescue: would it be more rescues?

Who really paid for the rescue: Banks, Taxpayers or ... ?

LTCM lessons for the possibilities of regulating hedge funds.

1. Main result: Information about the fund's open positions can affect the value of this positions, especially when the fund is short of cash. Regulations requiring to provide such information could be beneficial, BUT they have CONSIDERABLE costs.

Cost and benefit analysis of possible regulations has to be done carefully.

2. Fed rescue of LTCM and who could be a global CB. Could there be a global CB and if it could, whether the world should have one.

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# Financial Futures Markets

- **Financial Futures Contract**
  - 1. Specifies delivery of type of security at future date
  - 2. Arbitrage  $\Rightarrow$  at expiration date, price of contract = price of the underlying asset delivered
  - 3.  $i \uparrow$ , long contract has loss, short contract has profit
  - 4. Hedging similar to forwards: Micro vs. macro (portfolio) hedge
- **Traded on Exchanges:** Global competition
- Regulated by Commodity Futures Trading Commission (CFTC)
- **Success of Futures Over Forwards**
  - 1. Futures more liquid: standardized, can be traded again, delivery of range of securities
  - 2. Delivery of range of securities prevents corner (speculation)
  - 3. Mark to market and margin requirements: avoids default risk
  - 4. Don't have to deliver: netting

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**Strike Price:** The price at which the futures contract underlying a call or put option can be purchased (if a call) or sold (if a put). Also referred to as exercise price.

**Settlement Price:** The last price paid for a commodity on any trading day. The exchange clearinghouse determines a firm's net gains or losses, margin requirements, and the next day's price limits, based on each futures and options contract settlement price. If there is a closing range of prices, the settlement price is determined by averaging those prices. Also referred to as settle or closing price.

**Option Seller:** The person who sells an option in return for a premium and is obligated to perform when the holder exercises his right under the option contract. Also referred to as the writer.

# Hedging ForEx [FX] Risks

Forward contract = something is to be delivered on some specified future date

- **Example: Customer due 10 million DM in two months, current DM=\$1**
  - 1. Forward contract to sell 10 million euros for \$10 million, two months in Future
  - 2. Sell 10 million of euro futures
- Forward contracts to hedge ForEx risks

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Forward contract = something is to be delivered on some specified future date

- Forward forex rate == exchange rate at some specified future date
- Forward interest rate – interest rate fixed today on a loan made on some future date
- Forward Fed. Funds rate –
- Forward premium (if forward price > spot price)

Forward parity = notion that forward rate is unbiased predictor of future spot rate

## Futures contract

A legally binding agreement to buy or sell a [commodity](#) or [financial](#) instrument in a designated future month at a price agreed upon today by the buyer and seller. Futures contracts are standardized according to the quality, quantity, and delivery time and location for each commodity. A futures contract differs from an [option](#) because an [option](#) is the right to buy or sell, while a futures contract is the promise to actually make a [transaction](#). A future is part of a [class](#) of [securities called derivatives](#), so named because such [securities](#) derive their value from the worth of an [underlying](#) investment.

**Futures option** An [option](#) on a [futures contract](#).

**Original Margin:** The amount a futures market participant must deposit into his margin account at the time he places an order to buy or sell a futures contract. Also referred to as initial margin.

**Out-of-the-Money Option:** An option with no intrinsic value, i.e., a call whose strike price is above the current futures price or a put whose strike price is below the current futures price.

# Options

- **Options Contract**
- Right to buy (call option) or sell (put option) instrument at exercise (strike) price up until expiration date (American) or on expiration date (European)
- **Hedging with Options**
- Buy same # of put option contracts as would sell of futures
- *Disadvantage:* pay premium
- *Advantage:* protected if  $i \uparrow$ , gain if  $i \downarrow$

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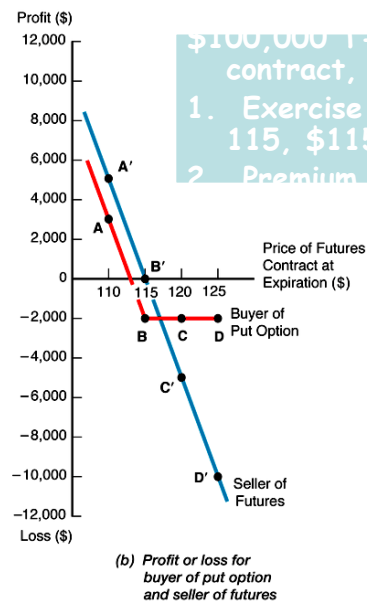
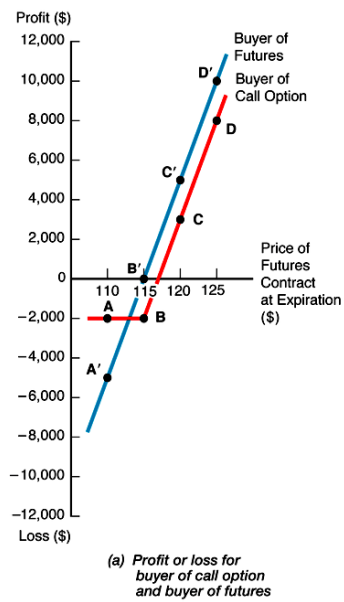
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## Option

Gives the buyer the right, but not the obligation, to buy or sell an asset at a set price on or before a given date. Investors, not companies, issue options. Buyers of call options bet that a stock will be worth more than the price set by the option (the strike price), plus the price they pay for the option itself. Buyers of put options bet that the stock's price will drop below the price set by the option. An option is part of a class of securities called derivatives, which means these securities derive their value from the worth of an underlying investment.

# Profits & Losses: Options vs. Futures



\$100,000 T-bond contract,  
 1. Exercise price of 115, \$115,000.  
 2. Premium = \$2,000

Futures: linear expected returns, but more risk than for options

Options: non-linear returns, but less risky (there is a lower bound for a loss, which is equal to premium)

# Factors Affecting Premium

- 1. Higher strike price (price of delivery in option contract)  $\Rightarrow$  lower premium on call options and higher premium on put options
- 2. Greater term to expiration  $\Rightarrow$  higher premiums for both call and put options (similar to yield curves & interest rate premium increase for bonds with longer maturities)
- 3. Greater price volatility of underlying instrument  $\Rightarrow$  higher premiums for both call and put options

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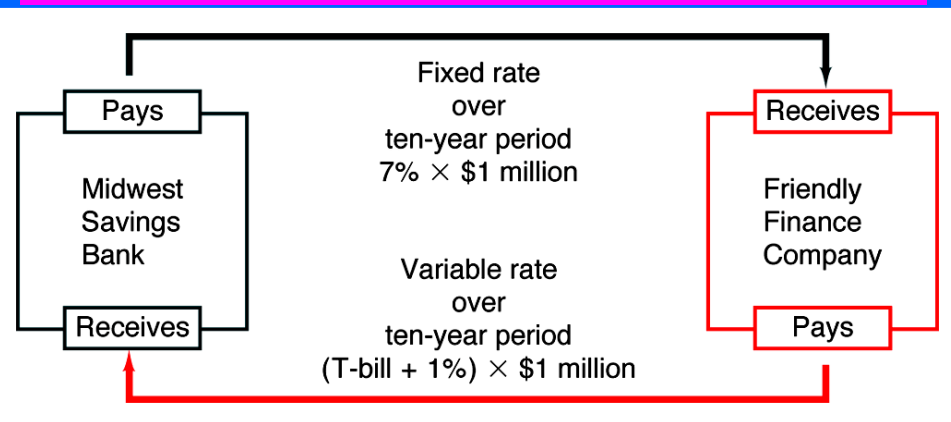
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Importance of volatility that is implied when option price is calculated. If volatility is higher (by 5% or by 20%) than others use in calculations, option price can be inflated. This is possible to inflate prices due to presence of transaction costs, and informational & market imperfections.

**Margin requirement** A performance bond paid upon purchase of a futures contract that protects the exchange clearinghouse from loss.

# Interest-Rate Swap Contract



1. Notional principle of \$1 million
2. Term of 10 years
3. Midwest SB swaps 7% payment for T-bill + 1% from Friendly Finance Co.

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Swaps are financial contracts to exchange the set of payments in one currency for the other (but not the assets), or exchange of fixed interest rate payment to floating ones

If Friendly Finance makes short-term loans (sells loans), it needs to hedge interest rate risks → it wants to hedge against fall in interest rates

Midwest Savings lends long-term (mortgages), collects funds short-term (owns) → needs to hedge against increase short-term of interest rates → buys variable rate, which give high income if Midwest Savings would need to pay higher price for their short-term funds.

Question: Why to enter into swaps or swaptions (swap options)?

Answer: Interest rate hedging. But if interest rate moves up → the party that pays fixed rate would want to default. And, if interest rate moves down, another party wants to default

Default risk related to incentives!

Exchange Rate Swap Contracts (originated in 1982)

World Bank loans to developing countries. World bank loan rates are determined by its own costs of borrowing.

US interest rates 17%, but German (D-mark) interest rates are about 8% and Swiss Franks 12% rates

But World Bank cannot borrow directly from Germany or Switzerland (their quotas were already exhausted)

IBM had D-marks and Swiss Franks, and wanted to exchange them for \$. IBM and World Bank entered into ForEx swap agreement.

# Hedging Interest Rates Volatility with Interest-Rate Swaps

- **Reduce interest-rate risk for both parties**
  - 1. Midwest converts \$1m of fixed rate assets to rate-sensitive assets, if int. rates rise  $\uparrow$ , it lowers its losses
  - 2. Friendly Finance if int. rates fall  $\downarrow$ , it lowers its losses
- **Advantages of swaps**
  - 1. Reduce risk, no change in balance-sheet
  - 2. Longer term than futures or options
- **Disadvantages of swaps**
  - 1. Lack of liquidity
  - 2. Subject to default risk
- **Financial intermediaries help reduce disadvantages of swaps**

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Similarly, one can Hedge Foreign Exchange Rates Volatility with Exchange Rate Swaps

# Hidden / Legal Risks: Swaps

- Millman, [p. 250-252] 1988 UK
- Hammersmith & Fulham is a London Borough (population is about the same as in Dayton, Ohio, USA (about 150.000-200.000))
- In 1980s M. Thatcher cut off powers of local authorities to raise taxes
- But Borough was faced with social welfare spending, which it didn't want to stop
- Township was making money via interest rates swaps. How?
- Borrowed funds from government (at low rate)
- Swaps: Township was lending to banks at fixed rate higher than governmental, and it was paying to the banks floating rate, and it was even lower than fixed rate for that they were paying for government funds. In 1986-87 they generated 25% of all British swaps (about £5bln)
- All this was fine, till 1988 sharp increase in interest rates, and continued increase in interest rates. → in 1988 Borough owed the banks over £150mln. Borough seeks legal advice - and lawyers determine that swap activities of local authorities were illegal, i.e., they have had no right to enter into swaps.
- Judge's Ruling: ALL swaps by local authorities in GB are illegal. Confirmed by House of Lords
- International Banks lost about £0.5bln but borough's taxpayers saved!

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In 1994 Orange County, CA – bankruptcy due to loss of \$2bln (27% of its portfolio) due to interest rates shifts. They were financing their spending via high-risk interest rate speculations. Nobody fully understood the risks that they were taking.

# Interest Rates Behavior & Mortgage Market: 1994 example

- Millman, p. 255-257 An example: securitization effects on yield curves
- Puzzle of interest rates behavior in 1994: Story: end of 1993 - slight raise of interest rates (Fed) (to slow down economy that was growing too fast) result: interest rates hike: long term bonds 10 year and 30 year were having almost equal rates. Why?
- Solution of the puzzle: mortgage securities market. When rates were falling mortgages were prepaid/refinanced. When rates went up, it signaled that refinancing is over. Hedging of mortgage securities → if short-term mortgages (i.e., when refinancing is doing on) need to sell short-term bonds short. But if mortgages are getting more long-term -- to hedge one need to sell short long-term bonds. → demand for long-term bonds down (people are selling them short) → price is falling ↔ interest rates raise. → Immediate & sharp increase in long-term interest rates as a result of a tiny increase in Fed int. rate → securities have huge effects on monetary policy transmission mechanism.
- OLD rules are no longer valid: **Monetary policy used to be like driving Ford, now it is like flying on the airplane**
- Parts of financial system that used to be isolated are now interdependent.

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# Next Lecture

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- Your preparation: read [M] Ch 13
- Review for your midterm
- Repeat / reread [M]:
- Ch. 1, 2, 3, 22, 4, 6, 7, 8, 13

# Summary of Today

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- Markets & their Linkages: Examples:
  - Legal risks: Swaps in UK 1988
  - Mortgages & interest rates behavior 1994
  - Global Capital Markets (GCM)  $\leftrightarrow$  global linkages
- Have a Nice Night