

Chapter 1

FINANCIAL MARKETS, FINANCIAL INSTRUMENTS, AND FINANCIAL CRISIS

Chapter Outline

This chapter is organized as follows:

1. Section 1.1 presents the trading characteristics of commodity contracts. The analysis concerns mainly oil markets.
2. Section 1.2 studies the main trading characteristics of commodity markets and instruments. The analysis concerns the instruments in the International Petroleum Exchange.
3. Section 1.3 develops the characteristics of crude oils and the properties of petroleum products.
4. Section 1.4 presents the trading characteristics of another commodity: Cocoa.
5. Section 1.5 illustrates the main trading characteristics of options. The analysis pertains mainly to equity options.
6. Section 1.6 studies the trading characteristics of options on currency forwards and futures.
7. Section 1.7 develops the trading characteristics of options. The analysis pertains mainly to bonds and bond options markets.
8. Section 1.8 provides examples of simple and complex financial instruments.
9. Section 1.9 provides the main reasons behind financial innovations.

Introduction

In the last three decades, there has been a wave of financial innovations and structural changes in the securities industry. The three main natural questions which arise are:

What are the specific features of the “new” financial contracts?

Why are there so many financial contracts?

What are the fundamental reasons behind the proliferation of financial assets?

A partial answer to such questions is given in the analysis of Miller (1986), Merton (1988), and Ross (1989), among others. These financial instruments are traded either in organized markets or in non-organized markets, known as over-the-counter markets, or OTC markets. These products are presented either in a straight forward form or in a package. They can be used to create several combinations with different risk and reward trade-offs.

Financial crisis, subprime and credit crunch in 2008–2009 are exacerbated by the use of derivatives in the areas of mortgages, credit and other areas of finance.

What are derivatives?

A derivative is a generic term to encompass all financial transactions, which are not directly traded in the primary physical market. It refers to a financial instrument to manage a given risk. The term includes forwards, futures, options, commodity contracts, etc.

What is a forward contract

They are the simplest and most basic hedging instruments. A forward contract is an agreement between two parties to set the price today for a transaction that will not be completed until a specified date in the future. An example is a forward contract for \$1 million, to be delivered in six months, at a price of 5.30 for a dollar. These terms obligate the seller of the contract to deliver \$1 million on the company’s account, for the price set today. On the other hand, the buyer has no alternative than to accept delivery under the terms of the contract. The only possibility for the buyer to cancel the contract at a later date, is to enter into a reverse forward contract, with the same bank or another institution, but at the risk of a loss (or a gain) since

the new forward rate will be set at a new equilibrium level. Forward rate contracts are flexible and allow for customized hedges since all the terms can be negotiated with the counterparty. However, each side of the contract bears the risk that the other side defaults on the future commitments. That is why futures contracts are often referred to as forward contracts.

What is a futures contract?

A future is an exchange-traded contract between a buyer and seller and the clearinghouse of a futures exchange to buy or sell a standard quantity and quality of a commodity at a specified future date and price. The clearinghouse acts as a counterpart in all transactions and is responsible for holding traders' surety bonds to guarantee that transactions are completed.

Like forward contracts, futures contracts are used to lock in the interest rate, exchange rate, or commodity price. But, futures markets are organized in such a way that the risk of default is always completely eliminated. This is possible by trading futures contracts on an organized exchange with a clearinghouse which steps in between a buyer and a seller, each time a deal is struck in the pit. The clearinghouse adopts the position of the buyer to every seller, and of the seller to every buyer, i.e., the clearinghouse keeps a zero net position. This means that every trader in the futures markets has obligations only to the clearinghouse, and has strong expectations that the clearinghouse will maintain its side of the bargain as well. The credibility of the system is maintained through the requirements of margin and daily settlements. The main purpose of the margin is to provide a safeguard to ensure that traders will perform their obligations. It is usually set to the maximum loss a trader can experience in a normal trading day. Daily settlements or marking to market just consists in a transfer of cash from one account to another. The elimination of default risk has a cost: contracts are standardized in order to bring liquidity to the market, there are only a few financial assets which are traded on futures markets and they do not necessarily correspond to the risk to be hedged. Therefore, there is no perfect hedge with futures contracts. The hedgers keep what is called a basis risk and a correlation risk which cannot be fully eliminated.

What are standard options?

Options are more flexible than forwards and futures in the sense they provide the buyer with the protection needed, and leave him/her with the

full benefits associated with a favorable development of the asset price, interest rate, or exchange rate. This nice feature has a price: the option premium. On the contrary, forward and futures prices are set at a level such that the initial price of the contract is exactly zero. A standard or a vanilla option is a security that gives its holder the right to buy or sell the underlying asset within a specified period of time, at a given price, called the strike price, striking price or strike price and no obligation to deliver. A European option can be exercised only on the last day of the contract, called the maturity date or the expiration date. An American option can be exercised at any time during the contract's life.

What are commodity contracts?

Commodity contracts are traded around the world. One of the main examples is oil. Oil has become one of the biggest commodity market in the world. Oil trading evolved from a primarily physical activity into a financial market. The physical oil market trades different types of crude oil and refined products. Prior to 1973, oil trading was a marginal activity and the industry was dominated by large integrated oil companies. The structure of the industry changed in the 1970s with the nationalization of the interests in major oil companies in the Middle East. The driving force behind rapid growth in oil trading is explained by the huge variability in the price of oil. Market participants are exposed to the risk of very large changes in the value of any oil. The emergence of the 15-day Brent market in the 1980s results mainly from the economic features of international trade in oil and the de-integration of the industry in the 1970s. As a consequence of nationalization in the OPEC region, the major companies lost many of the concessions which had provided them with equity oil. The 1979 crisis and de-integration created the necessary conditions for a market to merge. The major development in the late 1970s and early 1980s was the emergence of two systems of oil price determination. There was OPEC fixing at that time a price for a marker crude (Arabian Light) and a market for non-OPEC crudes in which prices were subjected to the pressures of economic forces. The developments spurred significant growth in market activity leading to the emergence of new trading instruments. By the end of 1985, the world market entered a new crisis. The oil shocks ended up with compromises that changed important features of the petroleum world. The international petroleum exchange, IPE, was established by representatives from 28 countries in order to offer the industry the means to manage the

price risk. The first contract, gas oil futures began trading in 1981. A Brent crude futures contract was launched in 1988. A natural gas futures contract is also traded. A network of Quote Vendors relay information on a real-time basis to end users in several countries worldwide. The Brent crude contract and the gas oil contract are used as benchmarks or price references in trading.

1.1. Trading Characteristics of Commodity Contracts: The Case of Oil

The oil market is ultimately concerned with the transportation, processing, and storage of a raw material. Since oil is a liquid, it requires specialized handling facilities for transportation, processing, and storage. These elements represent the basic building blocks for the physical oil market. The behavior of prices is influenced by the fundamental forces of demand and supply. The demand of oil depends on the state of the global economy. It is closely linked to the growth of the economy. The oil industry is not properly integrated. In general, oil producers maximize their output, subject to the technical constraints of the field. Since operating costs are lower than the sunk capital costs, oil is produced until its price reaches very low levels. Oil is often viewed as a highly political commodity. The threat of supply disruption remains real and political forces play an important role in the oil market.

1.1.1. *Fixed prices*

Outright prices.

A contract for the sale of a cargo of oil must stipulate the basic price, the guaranteed quality, and agreed price adjustment for quality deviations, availability date range, etc. These factors describe the elements of the price of a cargo of oil. Gasoil is sold in Europe at x dollars per metric tonne, based on a specific gravity. The important qualities for crude oil are gravity, measured in API degrees, metals content and sulfur. Crude is in general traded in US dollars per barrel. In Europe, oil products are generally sold in US dollars per metric tonnes. Timing can have an impact on pricing when the market is in backwardation or contango. Backwardation corresponds to a situation in which the price of the commodity available on a prompt basis is higher than that for deferred delivery. Contango corresponds to a situation in which a commodity is cheapest in the prompt position and gets

progressively more expensive in the future. Hence, the oil price depends not only on its quality but also on the delivery date range. The location of the oil affects its price.

Official selling prices.

Until the mid-1980s, traded crude oil, except that of US origin was priced at an official selling price, OSP. Even if an official price is quoted for crude oil, the price actually paid by a refiner is set in general at a premium or a discount to the OSP.

1.1.2. *Floating prices*

As oil prices became volatile, there was increasing uncertainty about the value of oil at the time it was to be loaded or discharged. As the oil market moved away from fixed prices, oil prices reflected the market value of the oil at the time of moving the oil. The growth of the forward market, futures markets, swaps, and options markets developed the pricing mechanisms.

1.1.3. *Exchange of futures for Physical (EFP)*

Exchange of futures for physical (EFP) provide a method of pricing a cargo of oil at a differential to the futures market. The buyer and the seller utilize existing futures positions that match their exposure on the physical oil market.

The buyer of a physical cargo transfers ownership to the seller (of the cargo) of a certain number of futures contracts, equivalent to the volume of the cargo of oil. The value of the futures contract is used to calculate the price of the physical oil. The seller becomes long futures contracts and the buyer short futures contracts at the agreed level.

1.2. Description of Markets and Instruments: The Case of the International Petroleum Exchange

Crude oil trade is a key nexus between the two main centers of activity: upstream exploration and production and downstream refining, and marketing. In this context, the price of crude oil results from the interaction between the signals provided by product markets and the revenue objectives of producers. The growth of the international spot market in crude oil

and the ensuing transformation in the structure of oil markets explain the way oil is priced today. The growth in the international spot market during the early 1980s induced the emergence of a market discovery system driven by marginal spot trading, which replaced administered selling prices. Wide swings in prices have fostered the growth of forward and futures markets as well as several risk-management tools. The values of oil grades of crude oil depend on the refined products that can be made from individual grades. Each refined product resulting from a barrel of crude oil has its own separate markets under the law of supply and demand. The upgrading technologies maximize the product output from a barrel of crude oil. The starting point of the process is the distillation of the crude oil. This involves heating the crude oil to gradually higher temperatures giving different types of hydrocarbons. The cracking process allows to break lighter gasoline and gas oil fractions out of heavy gas oil and certain kinds of residue. Refiners and oil-market participants rely on detailed assays of actual cargoes in order to determine the specific features of an individual crude oil. A refiner must evaluate transportation alternatives and the price dynamics of the market. There are more than 100 crude oils in international trade.

1.3. Characteristics of Crude Oils and Properties of Petroleum Products

Petroleum or crude oil can be described as a viscous brown to black liquid mixture. Petroleum contains a hydrocarbon mixture and non-hydrocarbon compounds such as sulfur, nitrogen, and oxygen compounds.

1.3.1. *Specific features of some oil contracts*

The IPE Brent Crude futures contract is one of the most important energy price indicators in the world. This contract represents the critical part of the Brent Blend complex which represents the benchmark for two thirds of the world's internationally traded crude oil.

Brent crude futures

There is no maximum price fluctuation imposed upon Brent crude futures. The contract can be settled in cash against a physical price index calculated by the IPE. It can be settled with physical delivery through the EFP

mechanism. The unit of trading is one or more lots of 1000 net barrels (42,000 US gallons) of Brent crude oil. The contract specifies the current pipeline export quality Brent blend as supplied at Sullom Voe. The contract price is in US dollars and cents per barrel. The minimum price fluctuation is one cent per barrel, which gives a tick value of US\$10. All open contracts are marked-to-market daily.

Gas oil futures

The IPE gas oil contract is a benchmark for the physical market in Europe and beyond. This contract is used as a price basis for most middle distillate spot trades in northwest Europe. Companies can use this contract to evaluate arbitrage, storage, and investment opportunities.

Natural gas futures

The natural gas futures contract was launched in January 1997. Since the launch, many changes to the contract have been made as the industry has uncovered new needs and opportunities. The IPE natural gas futures (NBP) contracts are traded through the IPE automated energy trading system (ETS) or by the EFPs. The contract size corresponds to a minimum of 5 lots of 1000 therms per lot of natural gas per day during the contract period. The contract price is in Sterling and in pence per therm. If not closed out at expiry, contracts obligate delivery or taking delivery on each day in that contract period of the number of lots remaining open upon expiry.

Options

The IPE offers American options contracts for Brent crude and gas oil futures. Options enable companies to carry out several complex and hedging techniques. The unit of trading is represented for IPE gas oil options is one IPE gas oil futures contract. The contract price is in US dollars and cents per tonne. The strike price increments are multiples of US\$5 per tonne. A minimum of 5 strike prices are listed for each contract month. Due to futures style margining, option premiums are not paid or received at the time of the transaction. Margins are received or paid each day according to the changing value of the option. The total value to be paid or received is only known when the position is closed. This is done by an opposing sale or purchase, the exercise or the maturity of the option. The options can be exercised into gas oil futures contracts.

1.3.2. *Description of Markets and Trading Instruments: The Brent Market*

Dated Brent and 15-day Brent

Two types of transactions can be done in the physical Brent blend market. The first, known as “dated Brent” cargo is a conventional spot transaction which refers to the sale of a specific cargo. The cargo is either available in a specific loading slot or is loaded and in transit to some destination. The second, known as “15-day Brent” is a forward deal, which refers to a standard parcel that will be made available by the seller on an unspecified day of the relevant month. Oil is sold f.o.b. (insurance, freight, and ocean losses are the buyer’s responsibility), but demurrage at the terminal is the seller’s. For 15-day Brent, the contract is a standard telex and there is no exchange to match sellers and buyers. The clearing of the market involves all participants. The clearing consists of two different operations book-outs and the seller’s nominations. A book-out is simply an agreement between some participants to cancel their contracts with a cash settlement procedure for the difference between an agreed reference price and the contract price. The contracts which are not cleared by a book out cancellation are cleared through the nomination process. Sellers through the forward market serve 15-day notices to buyers of cargoes for the relevant month. The 15-day market reveals the buyer’s uncertainty regarding the exact date of delivery and it is characterized by a lack of perfect price/volume transparency.

Spread trading.

Forward cargoes can either be traded as single cargoes with an absolute price agreed, or in spread trading. This latter case involves the simultaneous purchase or sale of at least two cargoes and appears in different forms.

Inter-month spreads.

Spread trading in the Brent market appears as transactions of the difference in price between Brent for delivery in different months using two Brent cargoes.

When trader A buys an April/May spread from trader B, then A has bought an April cargo from B and simultaneously sold a May cargo to B.

The inter-month spread is simply a position on the absolute level of the backwardation or contango between the delivery months. In general, a

contango appears when prices are higher for more distant delivery months. Backwardation is the reverse.

Inter-crude spreads.

It is possible to trade the differential against another crude oil as Dubai or WTI. When trader A buys an April Brent-Dubai spread, he buys the April Brent cargo and sells the April Dubai cargo. An inter-crude spread is a position taken on the path of the difference in prices between the crude oils. Trader A will gain if the price of the Brent strengthens relative to that of Dubai.

The box trade.

This strategy is implemented by taking a position on the movement of the relative backwardation (or contango) between two crude oil markets. The trader sells and buys simultaneously two inter-crude spreads. The strategy involves the trading of four cargoes. For example, a Brent-Dubai box spread involves the simultaneous purchase of a Brent cargo and the sale of a Dubai cargo for the same delivery month and the purchase of a Dubai cargo for another delivery month.

The IEP Brent futures contract.

The International Petroleum Exchange of London (IEP) trades Brent futures contract on cargoes of 500,000 barrels. The physical base of the New York Mercantile Exchange (NYMEX) contract is pipeline scheduling at Cushing Oklahoma of 1000 barrel batches.

IPE Brent contracts represent two contracts: one between the buyer and the clearing house and one between the seller and the clearing house. The clearing house is the International Commodities Clearing House Ltd (ICCH).

Exchange of futures for physical (EFPs).

An EFP is a physical link between the IPE Brent futures contract and North Sea spot market on the 15-day market. This can be used to exchange an IPE position for a spot cargo. It represents, for example, the exchange of a futures market position of 500 IPE lots, (i.e., 500,000 barrels), for a

15-day cargo. It can be viewed as a spread between forward Brent and futures Brent.

IPE Brent options.

The IPE's Brent American options contract was launched on 11 May 1989 trading lots of 1000 barrels of Brent blend. The IPE Brent futures contract is the underlying asset. The option is exercised, i.e., transferred to a Brent futures contract at any time before maturity. A call gives its holder the right to buy the underlying futures contract at a strike price defined in multiples of 50 cents per barrel. A put gives its holder the right to sell the underlying futures contract at a strike price defined also in multiples of 50 cents per barrel. Options are also traded on Brent delivery month spreads. The over-the-counter (OTC) market represents a series of personalized bilateral trades and provides tailor-made options on deals of any size. This market is used by several large financial institutions.

Swaps.

The swap allows the producer or the consumer of crude oil and oil products to lock in a price or a margin. The main participants are finance houses and the trading departments of large oil companies. A producer can arrange a swap for a given volume over a specified period at a price equating to a "mean" market price over that period. At each agreed settlement period, actual market prices for the agreed volume are compared to the value of that volume under the specified price in the swap transaction. When market prices are higher, the producer pays the swaps provider the difference times the agreed volume. When market prices are lower, the swaps provider pays the producer the difference times the agreed volume. In the swap transaction, there is a physical exchange of oil, but a series of netted transactions or contract for the differences.

1.4. Description of Markets and Trading Instruments: The Case of Cocoa

The International Cocoa Organization (ICCO) was established in 1973 to administer the first International Cocoa Agreement, that of 1972 and its successor Agreements, of 1975, 1980, 1986, and 1993. For further information, the reader can refer to library@icco.org. The Agreements

were concluded among the governments of cocoa producing and consuming countries, under the auspices of the United Nations. As on 13 July 1998, the membership of the ICCO comprised a total of 41 members.

1.4.1. *How do the futures and physicals market work?*

There are large differences between physical and futures prices. The cocoa trade is based on the actuals market and the futures market. The actuals market is known as the physical market, the spot market or the cash market.

Futures contracts are traded in lots of 10 tonnes. They represent a commitment to deliver or receive the quantity of cocoa implied by the contract at the expiry of the contract term. Any cocoa that has passed tests of quality and bean size through the terminal markets' grading process can be tendered against contracts. The buyer who takes delivery of cocoa from a terminal market would usually obtain material close to the minimum quality necessary to pass the market's grading test. In physical contracts, the prices tend to be higher because of a control of the specification of the material.

1.4.2. *Arbitrage*

Arbitrage involves the simultaneous purchase of futures or physical commodities in one market against the sale of the same quantity of futures or physical commodity in a different market. An arbitrage strategy is often implemented to take advantage of differentials in the price of the same instrument on different markets. Cocoa can be traded on CSCE in dollars and LIFFE in pound sterling. The arbitrage price can be derived by subtracting the CSCE price converted to pound sterling from the LIFFE price. In practice, London cocoa sells at a premium over New York cocoa because of a quality in the difference of cocoa.

The arbitrage price is affected by the forces of supply and demand and by exchange rates. Arbitrage allows speculation on whether the premium of London cocoa will increase or decrease over New York.

1.4.3. *How is the ICCO price for cocoa beans calculated?*

Is the ICCO price for cocoa beans related to the grade of cocoa?

The ICCO prices for cocoa beans are not related to a specific grade of cocoa but to the prices on the London and New York Terminal markets.

At LIFFE, the London Terminal market, and at the CSCE, the New York Terminal market, different grades of cocoa are deliverable against

contracts. However, each lot of cocoa is sampled and graded by Exchange graders.

1.4.4. *Information on how prices are affected by changing economic factors?*

Cocoa price movements can be separated into three categories: long-term, intermediate-term, and short-term. Long-term cocoa price fluctuations are induced by the links between the rate of new planting, production, stocks, and prices. Intermediate-term cocoa price fluctuations, consumption and stocks represent the response of the cocoa industry to annual variations in world cocoa production. Short-term cocoa price fluctuations reflect alternating tides of bullish and bearish speculative enthusiasm in the world's cocoa markets.

1.4.5. *Cocoa varieties*

The names Criollo, Forastero, and Trinitario refer to the three main types or groups of populations of *Theobroma cacao*, the cocoa tree.

The world cocoa market distinguishes between two broad categories of cocoa beans: “fine or flavour” cocoa beans, and “bulk” or ordinary cocoa beans. Fine or flavour cocoa beans are produced from Criollo or Trinitario cocoa-tree varieties, while bulk cocoa beans come from Forastero trees.

In 1998, the top producing countries are Cote d'Ivoire, Ghana, Indonesia, Brazil, Nigeria, Cameroon, and Malaysia. The top grindings countries in the world are the Netherlands, United States, Germany, Cote d'Ivoire, Brazil, United Kingdom, and France.

1.4.6. *Commodities — Market participants: The case of cocoa, coffee, and white sugar*

We describe some specific features regarding the cocoa, coffee, and white sugar contracts.

The case of cocoa

Producer in country of origin.

There are different systems of marketing the crop depending on the country.

Trade house.

Buys from country of origin and assumes risks associated with transporting and selling the product to buyers in consuming countries.

Processor.

Buys cocoa beans and/or produces cocoa liquor, powder, and butter.

Manufacturer.

Buys beans and/or sell the above products from the trade-houses and or processors.

Speculator.

The use of the cocoa contract by managed futures funds, who tend to take short-term positions. Institutional investors have a long-term view.

The case of coffee

Grower in country of origin.

There are different systems of marketing the crop depending on the country.

Trade house.

Buys from country of origin and assumes risks associated with transporting and selling the product to buyers in consuming countries.

Roaster.

Buys green coffee and roasts it.

Manufacturer.

Buys beans and/or sell the above products from the trade-houses and or processors.

Speculator.

The use of the Robusta coffee contract by managed futures funds, who tend to take short-term positions and institutional investors, who have a long-term view.

The case of White Sugar.

Producer in country of origin.

There is in general in each country a central sugar marketing organization that negotiates all domestic and international sales.

Trade house.

Buys from country of origin and assumes risks associated with transporting and selling the product to buyers in consuming countries.

Manufacturer.

Buys either raw sugar in bulk for further refining or white sugar in clean bags from both country of origin and trade-houses.

Speculator.

The managed funds are a vital part of daily volumes.

1.5. Trading Characteristics of Options: The Case of Equity Options

This section describes the specific features of options markets. A call gives the right to its holder to buy the underlying asset at a given price within or at a specified period of time. A put option gives the right to the buyer to sell the underlying asset at the striking price within or at a specified period of time.

Equity warrants are long-term options traded often in securities markets rather than in option markets. Covered warrants are (OTC) long-term options issued by securities houses.

1.5.1. Options on equity indices

These options are traded on the major indices around the world. Options on the spot index are cash-settled, i.e., there is no physical delivery of the underlying index.

1.5.2. Options on index futures

These options require upon exercise a long (a short) position in the future contract for a call (a put) in the same contract.

Table 1.1. Countries in the FT-actuaries world with listed index options.

Country	Index
USA	S&P 500 and S&P 100 since 1983
Japan	Nikkei 225 since 1989
France	CAC 40 since 1988
Germany	DAX since 1991
Switzerland	SMI since 1988
Canada	TSE 35 since 1987
the Netherlands	EOE since 1978
Australia	All ordinaries since 1983

Index options on stock indexes and stock index futures began trading in the United States in 1983 with the introduction of the S&P 100 contract on the Chicago Board Options Exchange. The 10 largest markets in the FT-Actuaries World Index have listed options (See Table 1.1).

In these countries, index futures are also traded. In general, combined options and futures volumes exceed trading in the underlying stocks. Volume is concentrated in one-month contracts. The volume in options with longer maturities takes place in the OTC. The OTC options market began to develop in 1988.

1.5.3. Index options markets around the world

In North America, options available are traded on several indices: S&P 100, S&P 500, Major Market, S&P MidCap, NYSE Composite, Value Line, Toronto 35, etc. Several listed options exist on indices like Value Line (PHX), National OTC (PHX) indexes, etc. In Japan, the main option contract is the Osaka Nikkei. Options exist also on the Singapore International Monetary Exchange (SIMEX), the Tokyo stock price index (TOPIX), etc. The OTC activity appears on the FT-Actuaries Japan Index. In Europe, several options are listed on European indices.

In Germany, listed DAX options trade on the Deutsche Terminbourse (DTB) on a screen-based system. Trading in options started in 1991. Investors use also the OTC market for DAX options with maturities greater than three months.

In France, CAC 40 options are traded on the Paris-Bourse. The OTC market is used mainly by large US and European investment banks. In the United Kingdom, FT-SE options are traded on the London International

Financial Futures Exchange (LIFFE). The market is dominated by major international banks and UK brokers.

The OTC market is mainly used by global investment banks and the major UK brokers.

In Switzerland, listed SMI options are traded on the Swiss Options and Financial Futures Exchange (SOFFEX) in an electronic-screen system. In the Netherlands, the EOE options market is mainly used by locals and some US banks and Dutch pension funds. In Spain, the main participants in the IBEX-35 options market are the US investment banks.

1.5.4. *Stock Index Markets and the underlying indices in Europe*

The CAC 40 Index

The CAC 40 index is computed using 40 stocks in the French market. It does not account for the distributions of dividends. The following formula is used:

$$I_t = \frac{1000 \sum_{i=1}^N q_{i,t} S_{i,t}}{K_t C A_0}$$

where:

t : instant at which the index is computed;

N : the number of stocks used (40);

$q_{i,t}$: number of shares of stock i , at date t ;

$S_{i,t}$: the price of stock i at date t ;

$C A_0$: market capitalization of the sample used in the reference date (December 1987) and

K_t : an adjustment coefficient at date t .

The STOXXSM 50 and EURO STOXXSM

The Dow Jones STOXXSM and Dow Jones EURO STOXXSM 50 indices are European indices launched on 26 February 1998 by STOXX limited. These indices provide a representative picture of European equity market performance. These indices are composed of 50 industrial, commercial, and financial blue chips. These indices are available on all major information networks and are disseminated every 15 seconds.

The methodology in constructing these indices is based upon a matrix approach that begins with 80% of the investible universe.

Futures on the Dow Jones STOXXSM and Dow Jones EURO STOXXSM 50 indices allow fund managers to insulate the asset value of their European equity portfolios regardless of their performance benchmark. This can be achieved by selling futures contracts in proportion to the sensitivity of these portfolios to fluctuations in the Dow Jones STOXXSM and Dow Jones EURO STOXXSM 50 indices. Selling derivatives allow market participants to stabilize their portfolios. Anticipating a rise (a fall) in prices, investors can buy (sell) index futures and sell at higher (lower) prices at a later date.

Theoretical values of index futures can be calculated at any time using the prices of the equity baskets represented by the Dow Jones STOXXSM and Dow Jones EURO STOXXSM 50 indices. The theoretical value corresponds to the value of the equity basket plus the basis, i.e., the cost of purchasing the index portfolio components, less dividends.

Options on Dow Jones STOXXSM and Dow Jones EURO STOXXSM 50 indices can be used as short hedging instruments, through the purchase of puts.

Derivatives on Dow Jones STOXXSM and Dow Jones EURO STOXXSM 50 indices give investors the tools to pursue simple strategies based on their expectations of market movements. Investors can buy call (put) options or sell put (call) options. Options can be used in arbitrage transactions allowing strategies to be pursued based on comparative fluctuations between equity markets within the Euro zone and the different countries.

Examples

The DOW JONES STOXXSM 50 AND DOW JONES EURO SOXXSM 50

The specific features of the Dow Jones STOXXSM 50 index are as follows.

Dow Jones STOXXSM 50 composition: Basket of 50 highly liquid European blue chips (16 countries), belonging to the main business sectors.

Calculation method: The index level is given by: $I = 1000$ (sum of real-time market capitalization for each component stock/adjusted base capitalization).

The index is calculated in real-time by STOXX Ltd.

Price quotation: The index is disseminated every 15 seconds by ParisBourse.

Table 1.2. Contract specifications.

Contract specifications	Dow Jones STOXX SM and Dow Jones EURO STOXX SM futures
Underlying index	Dow Jones STOXX SM and Dow Jones EURO STOXX SM indices
Trading unit	Contract valued at EURO 10 times the index quoted in the future
Price quotation	Index without decimal
Minimum price fluctuation (tick)	1 index point equivalent to EURO 10
Contract month	3 spot months, 2 quarterly contract months of the March, June, September, and December cycle
Last trading month	3rd Friday of the contract month at 12:00 p.m.
First trading day	First trading day following the last trading day of the previous contract month
Settlement/exercise	Cash settlement, expiration settlement price = arithmetic mean (with 2 decimals) of each index value calculated and displayed between 11:50 a.m. and 12:00 p.m. (41 values)
Margin	Margin information can be obtained from the MATIF/MONEP information department
Trading hours	NSC day session: 8:00 a.m.–5:00 p.m. NSC evening session: 5:05 p.m.–10:00 p.m.

The specific features of the Dow Jones Euro STOXXSM 50 index are as follows.

Dow Jones Euro STOXXSM 50 composition:

Basket of 50 highly liquid Euro zone (10 countries) blue chips, belonging to the main business sectors.

Calculation method:

The index level is given by: $I = 1000$ (sum of real-time market capitalization for each component stock/adjusted base capitalization). The index is calculated in real-time by STOXX Ltd. Price quotation: The index is disseminated every 15 seconds by ParisBourse (Table 1.2).

1.6. Trading Characteristics of Options: The Case of Options on Currency Forwards and Futures

These options are traded in the OTC market. The growth of the OTC market is due to its flexibility. In fact, many banks and financial institutions offer options with tailor-made characteristics in order to match the clients

needs. Options on the currency futures have been traded since 1982. These options are standardized contracts.

1.7. Trading Characteristics of Options: The Case of Bonds and Bond Options Markets

There are several types of bonds and bond options traded in organized and OTC markets. These financial instruments correspond, for example, to zero-coupon bonds, bonds with call provisions, puttable bonds, convertible bonds, bonds with warrants attached, exchangeable bonds, etc.

1.7.1. *The specific features of classic interest rate instruments*

Zero-coupon bonds.

These bonds are bonds with no periodic coupon payments. The interest due to the bond holder is given by the difference between the maturity value and the purchase price. This class of bonds is referred to as zero-coupon bonds and its price is given by the present value of the maturity value.

In the mathematics of bonds, continuous compounded interest rates and/or discrete compounded interest rates can be used.

For continuous trading in derivatives, interest rate is often continuously compounded using the factor e^{-rT} to discount US\$ 1 payable in T years at a rate r .

In this case, the value of a zero-coupon bond is computed by discounting its maturity value at this factor. When interest is accumulated annually for T years, discretely compounded interest rate is computed by using $(1/(1+r')^T)$. The equivalence between the two formulas appears when $r = \log(1+r')$.

A coupon-paying bond.

This bond is often regarded as a portfolio of several cash flows (the coupons) where each cash flow can be seen as a zero-coupon bond. Hence, a coupon-paying bond can be viewed as a package of zero-coupon bonds.

The principal amount of a bond issue can decrease or amortize during the life of the interest-sensitive instrument. The principal is paid back gradually at a given rate and interest is paid on the amount of the principal outstanding.

A corporate bond.

This is a bond issued by a firm. The bond obliges the issuer to pay interest rate charges and the principal amount according to a specified schedule.

If the bond is guaranteed by some assets of the issuer, it becomes a mortgage bond. If the only guarantee is represented by the credibility of the issuer, the bond is a debenture bond. Each bond issue is accompanied with a document known as indenture. It specifies the main features of the issue.

Some bonds are not redeemed before another class of debt. They are referred to as junior or subordinated bonds. The higher priority claims are referred to as senior bonds. A sinking fund provision is often inserted in the bond indenture to describe the way bondholders will be paid.

Bonds with specific features.

A bond with a call provision gives the right to the issuer to call the issue before the specified redemption date. A bond with a put provision gives its holder the right to put the bond back to the issuer at a fixed price.

Indexed bonds.

These bonds are useful when the operating profits of a corporation are exposed to the fluctuations of an index, as with a commodity price like oil, aluminium or inflation. The exposure risk can be partially hedged by issuing bonds whose interest rate payments and/or principal repayment is linked to the index, in such a way that the effective cost of debt is reduced when there is an unfavorable movement in the price index, and is increased to the benefit of the investors when the movement is favorable to the firm. Such a bond issue can be split into parts: the bull and bear tranches, so that investors can choose only one side of the risk exposure. These bonds allow some investors to take risky positions which are not directly available to them, or not allowed, on organized markets. Investors are ready to pay a premium for these opportunities which is translated into a reduced financing cost.

A convertible bond.

Entitles its holder the right to convert the bond into a certain number of units of the equity of the issuing firm or into other bonds.

A bond with an attached warrant.

It is simply a package comprising the bond and a warrant. Most of these bonds are Eurobonds issued in international capital markets.

An exchangeable bond.

It is similar to a convertible bond, with the exception that it gives its holder the right to exchange the bonds for the equity of another company, etc. When a corporation has a low credit rating and must implement a large investment program to survive, it may well be too costly to issue standard debt, while raising equity might dilute considerably the current shareholders' position. Then, warrants (bonds with attached warrants) and convertibles become the only affordable financing instruments.

Floating Rate Notes, FRN.

The value of an FRN depends mainly on the coupon date payment. The coupon is often determined as a mean of the interest rates applied to three-month treasury bills. A risk premium is added to the mean rate to account for the risk of the issuer.

Floating Rate Bonds, FRB.

The coupon payments are indexed with reference to a variable interest rate index as the rate on the three-month treasury bills or the rate on 30-year treasury bonds. Several floaters show implicit embedded provisions which have the specific features of call and put options. For example, the provision of the type Floor and Ceiling specifies a minimum coupon rate of $x\%$ and a maximum coupon rate of $y\%$.

Stripped bonds.

The cash flows from treasury bonds can be separated into two assets: an asset corresponding to the principal amount, (principal only, PO), and an asset corresponding to interest rates, (interest only, IO). This type of bond represents a stripped asset and is referred to as treasury-backed stripped. The amount of principal, PO, represents the value of a zero coupon bond. The amount of interest, IO, corresponds to a portfolio of zero coupon bonds. The separation between the cash flows can eliminate the reinvestment risk. It allows the investor to use different IO and PO in hedging strategies.

In 1985, some American Treasury bonds are traded in the forms of separate trading of registered interest and principal of securities (STRIPS). In the mortgage market, bonds are also traded in the forms of STRIPS as PO STRIP (payment of the principal) and IO STRIP (payment of interest rates).

Strips.

Correspond to an instrument called “Separate Trading of Registered Interest and Principal of Securities”. The separation between coupons and principal of a bond allows the creation of artificial zero-coupon bonds of longer maturities than would otherwise exist.

1.7.2. The specific features of mortgage-backed securities

These securities are linked to the financial crisis in 2007–2008 and mainly to the subprime. The mortgage is a pledge of real estate which is used to secure the payment of a loan originated for the purchase of a real property. The lender, known as the mortgagee, has the right to foreclose on the loan and to seize the property if the borrower (mortgagor) does not satisfy his contracted obligations.

A mortgage loan is specified by the interest rate of the loan, the number of years to maturity, and the frequency of payments. The mortgage instrument represents an instrument which is guaranteed by a real asset, a land, a building, etc. Mortgages can be divided into different classes according to the nature of the asset used as a guarantee.

Mortgages represent the underlying collateral of mortgage-backed securities. When bonds are guaranteed by the shares of a firm, they are referred to as collateral trust bonds. When the bond is guaranteed by a building for example or other assets of the issuer, it is a mortgage security. If a firm has 100 securities and uses a guarantee of 30, it can issue 30 of mortgage bonds.

In the United States, the Federal National Mortgage Association (FNMA), the Government National Mortgage Association, GNMA, and the Federal Home Loan Mortgage Corporation, (FHLMC) play an important role in the mortgage market. The FNMA introduces mortgage-backed-securities (MBS), which are created by pooling mortgage loans and using this pool of mortgage loans as collateral for the security. The cash flow of an MBS is a function of the cash flows of the underlying mortgage pool.

If you consider an entity that purchases several loans, pools them, and uses them as collateral for issuance of a security, the security created is referred to as a mortgage pass-through security. The security is guaranteed by the GNMA, the FNMA, and the FHLMC.

Pass-through securities can be issued also by private entities. In this case, they are referred to as conventional pass-throughs.

When mortgage loans are used in a pool to create a pass-through security, they are said to be securitized. The process of creating the pass-through security is known as the securitization of mortgage loans.

The FHLMC introduced in 1983, the collateralized mortgage obligations, (CMO). Since an investor in a pass-through security is exposed to the total pre-payment risk due to the pool of mortgage loans underlying the security, it is possible to create three classes of bonds with different par values. This can be done by indicating how the principal is distributed from the pass-through security. In general, there are three classes: A, B, and C. This mortgage-backed security refers to a CMO.

The total pre-payment risk for the CMO remains similar to that of the mortgage loans. The stripped MBS becomes an attractive instrument in managing portfolios of mortgage securities. It is possible to forecast the prepayments from a pass-through security. Therefore, some pre-payment benchmark conventions must be known. In general, the Standard pre-payment model, PSA developed by the public securities association can be used. This benchmark is expressed as a monthly series of annual constant pre-payment rates, CPRs. The CPR is converted into a monthly pre-payment rate, known as the single monthly mortality rate (SMM) where $SMM = 1 - (1 - CPR)^{1/12}$.

The PSA model assumes that pre-payment rates will be low for newly originated mortgages. The rate will speed up as the mortgages become seasoned. For more details, see Fabozzi (1993).

1.7.3. The specific features of interest rate futures, options, bond options, and swaps

Interest rate futures contracts

A futures contract is an agreement between a buyer or a seller and an established exchange to take or make delivery of a given commodity at a specified price at a given delivery or settlement date. An investor can be long (a buyer) or short (a seller). Each investor must deposit an initial margin before trading futures contracts. The margin used to guarantee the transactions can attain a minimum level known as the maintenance

margin. The margin varies with the variation in the futures price. The futures contract is marked to market at the end of each trading day and is subject to interim cash flows. The main difference between futures contracts and forward contracts is that forward contracts are OTC instruments which are nonstandardized and are subject to counter-party risk. There are several traded interest rate futures contracts. Interest rate futures contracts are traded on treasury bonds, notes, bills and on the LIBOR rate.

Interest rate futures options are traded on T-bond futures, T-note futures, Eurodollar futures, etc.

Treasury bill futures

The underlying asset of this contract is a short-term debt obligation. The treasury bill is quoted in the cash market in terms of the annualized yield on a bank discount basis:

$$Y_d = \left(\frac{D}{F} \right) \left(\frac{360}{t} \right)$$

where:

D = difference between the face value and the price of a bill maturing in t days, known also as a dollar discount;

F = face or nominal value and

T = number of days remaining to maturity.

The treasury bill futures contract is quoted in terms of an index associated to the yield as follows: Index = $100 - (Y_d)(100)$.

Eurodollar futures

Eurodollar represent the liabilities of banks outside the United States of America. The London Interbank offered rate, LIBOR is paid in Eurodollars. The underlying asset of the Eurodollar futures contract is the three-month Eurodollar. The contract is settled in cash.

Treasury bond futures

Treasury bond futures contracts are traded on several exchanges. The underlying asset of the futures contract traded on the Chicago Board of Trade is 100,000 par value of a hypothetical 20-year, 8% coupon-bond. The futures price is quoted in terms of par being 100. The seller of the futures contract can unwind his position before the maturity date by buying back

the contract. If he decides to make delivery, the seller must deliver some treasury bond chosen from the list of specific bonds published by the CBT.

The delivery process allows the seller of the futures contract to choose from one of the acceptable deliverable treasury bonds.

The CBT uses conversion factors for the computation of the invoice price of each deliverable treasury. This factor is determined before a contract with a given settlement date begins trading and it remains constant.

The invoice price indicates the price paid by the buyer when the treasury bond is delivered. It corresponds to the settlement futures price plus accrued interest and is calculated as follows:

$$\text{Invoice price} = \text{Contract size (settlement price of the futures contract} \\ \times \text{times conversion factor)} + \text{accrued interest.}$$

The term accrued interest can be defined as follows:

Accrued interest

Bond market prices are clean prices since they are quoted without any accrued interest. The accrued interest corresponds to the amount of interest since the payment of the last coupon. It is computed as follows:

$$\text{Accrued interest} = \text{interest due in full period } (N_1/N_2)$$

with

N_1 = number of days since the last coupon date and

N_2 = number of days between coupon payments.

The dirty price corresponds to the quoted clean price plus the accrued interest. Upon delivery, the seller will deliver the bond which is cheapest to deliver, also known as the cheapest to deliver (CTD). The seller must compute the return to be earned from buying bonds and delivering them at the settlement date. The return is computed using the price of the treasury issue and the futures price for delivery. This return is referred to as the implied repo rate. The CTD issue corresponds to the issue with the highest implied repo rate since it gives the seller the highest return by buying and delivering the issue.

The delivery process gives the contract seller some options.

The quality option, also known as the swap option, allows the seller to choose among different acceptable treasury issues.

The timing option gives the seller the right to choose the exact time during the delivery month to make delivery. The wildcard option allows the seller to give a notice of intent to deliver up to 8 p.m. Chicago time

after the closing of the exchange (3:15 p.m.) on the date when the futures settlement price is scheduled.

Treasury bond futures

The CBT created in 1975 the first financial futures contract a futures for mortgage-backed securities. These securities are issued by the Government National Mortgage Association (GNMA). The underlying asset of a treasury bond futures contracts on the CBT is a 15-year T-bond with a coupon rate of 8%. This rate has changed since then.

The invoice price received by the party with a short position in the contract is given by the bond futures settlement price which multiplies the delivery factor for the bond to be delivered plus the accrued interest.

For each deliverable bond, there is a delivery factor which is calculated with respect to the coupon rate and the time to maturity of that bond.

For example, the conversion factor for a bond with coupon rate r_c and a maturity in m years is:

$$CF = \sum_{j=1}^{2m} \frac{r_c/2}{(1 + 0.04)^j} + \frac{1}{(1 + 0.04)^{2m}}$$

Since there are many bonds that can be delivered in the T-bond futures contract, the CTD is that deliverable issue for which the following difference is minimized:

Quoted bond price – settlement futures price (C. factor).

The basis or the difference between the spot and futures prices is minimal for the CTD bond or:

$$b_t^i = B_c^i - f_t CF^i$$

where:

B_c^i = current price of the i th deliverable bond;

f_t = bond futures settlement price and

CF^i = conversion factor for the i th bond.

Forward rate agreements

A forward rate agreement (FRA) allows a company to reduce interest rate exposure by locking into a rate of interest. In this contract, the parties agree to exchange, at some future date, interest payments on the notional amount of the contract. The buyer of an FRA contract agrees to pay interest at a

specified rate and to receive interest at a floating rate that prevails at a future date T .

Interest rate swaps

An interest rate swap is an agreement between two counter-parties to exchange periodic interest payments. These interest payments are determined with reference to a pre-determined principal amount known as the notional principal amount. In general, one party, the fixed rate payer, agrees to pay the other party fixed-interest payments with a given frequency at some specified dates. The other party, the floating rate payer, agrees to pay some interest rate payments that vary according to a reference rate. The London Inter-bank Offered Rate, LIBOR, is often used as the reference rate.

Risks in bond investments

The buyer of a bond faces different risks: an interest rate risk, a re-investment risk, a default or credit risk, an inflation risk, an exchange risk, a liquidity risk, etc.

The interest rate risk

The variations in interest rates modify the bond price. A higher interest rate leads a lower bond value and a lower interest rate produces a higher bond value.

The re-investment risk

The return for a bond buyer comes from the perceived interest (the coupons), the capital gain (variation in the bond price), and the interest from the placement of the coupons.

The credit and default risk

This risk accounts for the possibility of the borrower to honor his liabilities: payments of coupons and principal at their exact timing. The credit crunch in 2008 is largely due to this risk.

The risk to call

The issuer can insert a provision in the debt contract that allows him to buy back his bonds before the maturity date. In this case, the return for

the bondholder can be different from the return anticipated when buying the bond.

The inflation risk

The variations in inflation rates affect the return from holding the bond. All bonds are expressed in nominal terms. The difference between a nominal return and the inflation rate gives the return in real terms.

The exchange rate risk

The price of a bond denominated in a foreign currency is affected by the changes in exchange rates. These rates can affect significantly the return from holding the bond.

The liquidity risk

The liquidity risk reflects the difficulty in selling the bond at a given market price. This risk can be measured by the spread observed in the market place. The higher the spread, the greater is the liquidity risk. The quality of a bond is denoted by a given letter or rating. Rating agencies like Moody and Standard & Poor give their rating to show the risks associated with investments in bonds. The passage from a letter A to B or C and D reflects a higher risk. The risk premium is higher for bonds of type B than type A.

This situation characterises most Islamic bonds or sukuk for which there is often no secondary markets.

1.8. Simple and Complex Financial Instruments

Forward-start options

These options give an answer to the following question: how much can one pay for the opportunity to decide after a known time in the future, known as “the grant date”, to obtain at the money call with a different time to maturity with no additional cost?

Pay-later options

For these options, the premium is paid upon exercise. They are contingent options. In fact, the buyer has the obligation to pay upon exercise when the option is in the money regardless of the amount by which the underlying asset price exceeds the strike price.

Chooser options

They are on the holder, immediately after a pre-determined elapsed time, to choose whether the option is to be a call or a put. There are two kinds of chooser options: simple and complex choosers.

Options on the minimum or the maximum of two or more risky assets

These options may be useful in the pricing of a wide variety of contingent claims, traded assets, and financial instruments whose values depend on extreme values. Examples include discount option bonds, compensation plans, risk-sharing contracts, collateralized loans, and growth opportunities among other contracts.

Two-color rainbow options

They refer not only to options on the maximum (minimum) of two assets, but also to all options whose pay-off depend on two or more underlying assets: options delivering the best of two assets and cash, spread options, portfolio options, dual-strike options, etc.

Options with extendible maturities

They include any financial contract with provisions concerning a re-scheduling of payments and a re-negotiation of terms.

There are many types of exotic and second generation options which take different forms. They include path-dependent options, lookbacks, partial lookbacks, Asian options, shout options, binaries or digitals, knockouts or barriers, ladder, and cliquet options among other things.

Asian options

Asian options have been popular in the foreign exchange market, interest rate and commodity markets. These financial innovations are traded in OTC markets and allow investors to accomplish several hedging strategies.

Examples of these options include commodity-linked bond contracts and average currency options. Commodity-linked bond contracts give the

right to the holder to receive the average value of the underlying commodity over a certain period or the nominal value of the bond, whichever is higher.

Barrier options

These belong to the family of path-dependent options. They are in life when they knock-in and are extinguished when they knock-out. They are sometimes referred to as knock-ins or knock-outs when the underlying asset hits (or does not hit) the barrier.

The standard form of barrier options refers to European options which appear or disappear (ins and outs) when the underlying asset reaches a certain level known as the barrier. This barrier or knock-out level is set below the strike price for the call and above it for the put. For example, an in barrier option comes into existence whenever the underlying asset value hits a specified level. The right to exercise an out barrier option is forfeited when the barrier is hit.

Ratio options

These are options on the ratio of two asset prices, index levels, commodities, etc. An example is given by the dollar-denominated European option on the ratio of the German DAX stock index to the French CAC index.

Innovations in OTC options markets not only involve certain relations between the underlying asset price and the strike price but also on the number of time units for which a certain condition is satisfied. This corresponds, for example, to financial assets which are traded within a specified range.

Structured products with embedded digitals are much more interesting than vanilla digitals. There are many types of range structures which may be in the form of range binaries, at maturity range binaries, rebate range binaries, mandarin collars, mega-premium options, limit binary options, boundary options, corridors, wall options, mini-premium options, volatility options, etc.

Complex digitals or binaries

In their complex forms, complex digitals or binaries may be presented in different forms: compound digitals, boolean digitals, and corridors. Compound digitals obey the same principle as compound options and take different forms: quanto digitals, barriered digitals, and options on digitals.

1.9. The Reasons of Financial Innovations

Financial engineers are working on the design and the valuation of these financial instruments and the new strategies for portfolio and risk management.

The main questions are:

Why there are so many new financial instruments?

Why has the wave of financial innovation not stopped?

The most common explanation often advanced by market authorities is that financial markets are incomplete and that these instruments allow us to complete these markets. However, as noted by Ross (1989), this explanation seems awkward. In fact, the success in valuing these financial instruments comes from the fact that they are regarded as contingent claims or derivative securities which are spanned by the underlying assets on which they are traded and a riskless bond. This allows the derivation of simple valuation formulas in complete markets.

In reality, markets can never be fully complete but with regard to the price determination, it is often assumed that markets are complete. Otherwise, the pricing of these instruments would be a difficult task.

According to Ross (1989), there are two dominant features which contribute to the wave of financial innovation: the role of institutions and the role of marketing. These reasons complement the arguments by Miller (1986) and Merton (1988). Miller's (1986) analysis is based on the role of taxes and regulations in the innovation process.

In his analysis, Miller considers taxes as a source of much of the motivation for financial innovation. Merton (1988) proposes a detailed analysis of the production function underlying the innovation in derivative securities markets. He puts the accent on the role of transaction costs.

The analysis by Ross (1989) ignores production costs and is interested mainly in the role of agency costs and marketing costs, which help to shape the form of the new institutional features. Agency costs and restrictions may arise from monitoring and the regulatory environment. They may result either from the natural needs of market relations between institutions and participants or may be imposed by the government.

The first reason in Ross's analysis is that financial markets become institutional markets since institutions are the most significant participants in these markets. This does not mean that financial markets are solely markets where institutions operate, but rather markets where institutions are significant forces.

Financial institutions range from transparent through translucent to opaque. In this classification, a mutual fund is regarded as a transparent institution and an insurance company is seen as an opaque institution. A pension fund is regarded as a translucent institution. Institutions can be regarded as financial market players whose activities are dominated by agency relations.

The second reason in Ross's analysis of financial innovation is the role of marketing. In perfect and frictionless markets, selling a financial instrument is costless. In reality, the less familiar and the more esoteric the financial instrument, the more costly it is to sell. When the states of nature are exogenously specified, each security can be defined by its pay-offs corresponding to the different states. Since uncertainty remains about these pay-offs, new states are generated and are not yet spanned. This uncertainty may be "nearly" spanned. In complete markets, marketing can "explain" the pay-offs in a view where the marginal cost equals the marginal benefit from a transaction. This view of complete markets allows the pricing of financial instruments with a great accuracy. It recognizes the existence of a marketing cost for a new financial instrument or strategy. This instrument or strategy, corresponds in the beginning to the needs of some institutions or retail clients. In its mature phase, marketing costs are reduced since the financial instrument or strategy becomes a standard commodity. Buying or selling securities which are standardized and trade in well functioning markets with large volume induce nearly no marketing costs. This is not the case for the tailored and low-grade securities. Ross makes a distinction between marketed and non-marketed securities rather than between high- and low-grade securities. Stocks, for example, are low-grade securities which trade in well organized and competitive markets. Financial futures are examples of low-grade innovations which have evolved into low-cost well-traded commodities. This evolution is costly and the ultimate success relies on the ability to standardize the financial product and to sustain a sufficient volume of trade to justify the initial costs.

In Ross's model, the existence of new financial instruments and strategies and the marketing process are based on the cost structure of the marketing networks and distribution channels. It is the institutional structure of contracts and incentives that allows the process of financial engineering to continue. Hence, it seems that institutional markets and financial marketing are central to the understanding of financial innovations. For more details, see Ross (1989).

1.10. Derivatives Markets in the World: Stock Options, Index Options, Interest Rate and Commodity Options and Futures Markets

1.10.1. *Global overview*

Several institutions produce information regarding futures and options around the world.

Often, summary statistics on volume and open interest are given for futures and index options.

Index options on stock indexes and index futures contracts begin trading in the U.S in 1983. This has been facilitated with the introduction of the SP 100 index contract on the Chicago Board Options Exchange. Today, index futures are traded and are more liquid than index options.

1.10.2. *The main indexes around the world: a historical perspective*

The first options traded on indexes can be traced back to US (SP 500 and SP 100 in 1983), Japan (Nikkei 225 in 1989), UK (FT-SE 100 in 1984), France (CAC 40, 1989), Germany (DAX, 1991), Switzerland, (SMI, 1980), Canada (TSE 35, 1987), Netherlands (EOE, 1978), Australia (All Ordinaries, 1983), ...

Options volume in listed markets is mostly concentrated in one month contracts in all markets. For most options, volume with longer maturities take place in OTC markets.

In the OTC market, trading began early in 1988. Several investors buy long-term puts to implement portfolio insurance strategies.

Today, dealers run large OTC options books. This can reduce or eliminate risk in the market.

North America.

U.S index options trading appear on listed markets and OTC markets with customized features.

Options are traded on SP 100, SP 500, MMI, SPMidCap, options on small capitalization indexes, the NYSE Composite index.

Main information used concerns the average daily volume, Average daily dollar volume (in millions) and Index level.

Options on SP are preferred by retail investors.

MidCap Options and options on SP 500 index attract the interest of institutional money managers and pension funds.

SP 100 are the mostly traded contracts in the U.S.

SP 500 are the have the greatest open interest in the U.S.

Hundred billions of dollars are traded.

Institutional use of index options:

Covered call writing: a call is sold and the underlying asset is held. Long index put strategy and collar positions, which is preferred by institutions. The collar can lead to a skew in index options implied volatilities: out of the money puts have higher volatilities than calls. Options are available on National OTC (PHX) indexes.

Stock index markets in North America.

The SP 500 index fluctuated in a band. The move gives a volatility in a range of 10%–25%. We can represent a monthly volatility for the year. With its heavier dose of cyclical stocks, the DJIA has been outperforming for some years the broader market.

We can compute historical volatility and implied volatility from at the money options. We should compute the spread.

The following Tables shows the volume (number of contracts traded) in several countries.

Japan.

Options exist on Osaka Nikkei, options on TOPIX.

Japanese institutions often use for their long term options exposure or customized strike prices fixed income securities with embedded index options.

Osaka Nikkei options are used by domestic institutional in short term trading. Regulations by the Ministry of Finance prevent pension funds from completely hedging their portfolios (hedging limit 50%).

Hedgers integrated their activities into equity risk management systems.

Life insurance companies focus on using options for directional trading. Offshore hedge funds use the Osaka Nikkei options to take outright short-term trading positions.

The Government intervenes to support the market. Foreign institutions act in the OTC market for different reasons:

They are restricted by regulation from trading listed options.

They do not want to incur the costs of rolling over.

Competition among dealers makes this market very competitive.

Sector options are popular in Japan. The following Table provides the volume (number of contracts traded) in several countries for index options.

Stock index options

Exchange	2004		2003
	Volume Traded (Number of Contracts)		
Americas			
American SE	40,985,108	33,137,709	123.68%
BM&F	89,965	0	
Bourse de Montreal	336,544	961,650	35.00%
Chicago Board of Trade (CBOT)	762,007	263,629	289.05%
Chicago Board Options Exchange (CBOE)	136,679,303	110,822,096	123.33%
Chicago Mercantile Exchange (CME)	6,451,862	5,168,914	124.82%
International Securities Exchange (ISE)	40,886,923	23,979,352	170.51%
MexDer	35,989	0	
New York Board of Trade (NYBOT)	181,215	110,079	164.62%
Options Clearing Corp.	0	0	
Pacific SE	14,119,270	15,744,139	89.68%
Philadelphia SE	25,360,908	19,746,264	128.43%
Sao Paulo SE	1,589,765	1,600,461	99.33%
Europe, Africa, Middle East			
Athens Derivatives Exchange	941,387	1,388,985	67.78%
BME Spanish Exchanges	2,947,529	2,981,593	98.86%
Borsa Italiana	2,220,807	2,505,351	88.64%
Copenhagen SE	1,299	8,440	15.39%
Eurex	117,779,232	108,504,301	108.55%
Euronext	99,607,852	103,986,651	95.79%
JSE South Africa	11,268,763	10,505,417	107.27%
OMX Stockholm SE	8,947,439	6,371,381	140.43%
Oslo Bors	681,783	543,090	125.54%
Tel Aviv SE	36,915,103	29,353,595	125.76%
Warsaw SE	124,392	153,106	81.25%
Wiener Börse	40,855	27,680	147.60%
Asia Pacific			
Australian SE	794,121	630,900	125.87%
BSE, The SE Mumbai	56,046	43	130339.53%
Hong Kong Exchanges	2,133,708	2,150,923	99.20%
Korea Exchange	2,521,557,274	2,837,724,956	88.86%
National Stock Exchange India	2,812,109	1,332,417	211.05%
Osaka SE	16,561,365	14,958,334	110.72%
SFE Corp.	523,428	585,620	89.38%
Singapore Exchange	247,388	289,361	85.49%
TAIFEX	43,824,511	21,720,084	201.77%
Tokyo SE	17,643	98,137	17.98%
Total	3,137,482,893	3,357,354,658	93.45%

Exchange	2005	2004
	Volume Traded (Number of Contracts)	
Americas		
American SE	8,678,564	7,290,157
BM&F	6,344	16,485
Bourse de Montreal	650,186	336,544
Chicago Board of Trade (CBOT)	728,349	762,007
Chicago Board Options Exchange (CBOE)	192,536,695	136,679,303
Chicago Mercantile Exchange (CME)	15,106,187	6,451,862
International Securities Exchange (ISE)	4,464,094	83,358
MexDer	37,346	35,989
New York Board of Trade (NYBOT)	217,334	181,215
Options Clearing Corp.	0	0
Philadelphia SE	6,234,567	5,275,701
Sao Paulo SE	2,257,756	1,589,765
Asia Pacific		
Australian SE	1,163,260	794,121
Bombay SE	100	NA
Hong Kong Exchanges	3,367,228	2,133,708
Korea Exchange	2,535,201,693	2,521,557,274
National Stock Exchange India	10,140,239	2,812,109
Osaka SE	24,894,925	16,561,365
SFE Corp.	680,303	523,428
Singapore Exchange	157,742	247,388
TAIFEX	81,533,102	43,824,511
Tokyo SE	20,004	17,643
Europe, Africa, Middle East		
Athens Derivatives Exchange	700,094	941,387
BME Spanish Exchanges	4,407,465	2,947,529
Borsa Italiana	2,597,830	2,220,807
Eurex	149,380,569	117,779,232
Euronext.liffe	70,228,310	99,607,852
JSE	11,473,116	11,303,311
OMX	12,229,145	8,947,439
Oslo Børs	515,538	695,672
Tel Aviv SE	63,133,416	36,915,103
Warsaw SE	250,060	78,752
Wiener Börse	37,127	40,855
Total	3,203,028,688	3,028,651,872

Europe.

In Germany.

Listed DAX options are done on a screen-based system.

Major players in this market are the large U.S and Continental investment banks.

In France.

Listed CAC 40 options trade on the French options market where trading is dominated by locals taking speculative positions and by large investment banks.

Institutional users are French insurance companies and fund managers. Players seek leveraged exposures on the market.

Guaranteed funds on the CAC 40 issued by French banks are popular among retail investors. CAC 40 options are used as part of these products. Major participants in the OTC market are large U.S and European investment banks.

Stock index markets in France.

- An interesting development in the CAC 40 futures is the distribution of open interest across various months.
- Institutions have led to move into the quarterly contracts to eliminate the chore of rolling on a monthly basis.

The lack of a developed stock-borrowing market can reduce trading in futures.

Professional traders can use the futures to hedge OTC options. To hedge collars traders can be short futures.

Arbitrageurs (short stock/long futures) can unwind easily their positions.

United Kingdom.

The market is dominated by major international banks and brokers. Short-term maturities have the most liquidity. End-users are mainly U.K institutions for hedging and guaranteed funds.

In OTC markets, the volume is also high because of greater liquidity in the longer-dated contracts. There is flexibility in expiration dates.

Switzerland.

Options are traded on the SOFFEX in an electronic screen system. Active participants are major Swiss and American Banks. End users are a mixture

of short-term speculators and international institutions looking for long exposures.

The OTC market is important because there is a need for longer-term strategies on the SMI from pension funds.

Zero premium collars are very popular.

Netherlands.

This market is dominated by locals who service a retail base.

Users are mainly pension funds who hedge equity portfolios.

The index must be compiled using a specific method.

The weighting of the index can overweight smaller, domestically oriented stocks and underweight larger, more internationally oriented stocks. For example, stocks can be weighted using a market capitalization and the maximum weight of a stock in the index will not exceed 10%. This puts a cap on some stocks.

The following Table gives the notional value (value traded of stocks), the open interest (positions opened and still not unwind) and the option premiums for several countries.

The following Tables provide different information for several markets and instruments. The reader can compare the different markets and instruments using these Tables (source: World Federation of Exchanges).

DERIVATIVES - 3.1 STOCK OPTIONS										
Exchange	2006	2005	Notional Value		Open Interest		Number of Trades		Option Premium	
	Volume Traded (Nber of Contracts)		2006	2005	2006	2005	2006	2005	2006	2005
			(USD millions)						(USD millions)	
Americas										
Americas SE	198,994,609	193,086,271	45,779	42,238	NA	NA	4,709,107	7,652,680	NA	NA
Boston Options Exchange	92,260,125	77,592,231	NA	NA	NA	NA	NA	NA	NA	NA
Bourse de Montreal	12,265,461	10,032,227	68,947	54,904	1,583,405	1,346,141	732,202	554,076	2,212	1,645
Buenos Aires SE	49,235,173	92,386,787	NA	NA	1,654,931	1,605,194	NA	NA	456	547
Chicago Board Options Exchange (CBOE)	390,657,577	275,646,980	1,960,297	1,264,511	187,953,281	151,157,355	25,792,732	16,820,556	98,751	61,220
International Securities Exchange (ISE)	583,749,059	442,387,776	NA	NA	NA	NA	NA	NA	NA	NA
MexDer	448,120	135,931	829	208	0	2,630	62	49	NA	NA
Options Clearing Corp.	0	0	NA	NA	220,032,992	181,694,503	NA	NA	NA	NA
Pacific SE	196,586,356	144,780,498	NA	NA	NA	NA	NA	NA	NA	NA
Philadelphia SE	265,370,986	156,222,383	89,732	49,318	8,846,285	8,379,867	15,843,704	7,190,023	89,732	49,318
Sao Paulo SE	285,699,806	286,352,631	513,350	392,331	1,833,355	1,824,504	6,542,663	5,777,709	3,746	7,999
Asia Pacific										
Australian SE	20,491,463	21,547,732	303,886	270,423	1,766,513	1,678,335	1,474,017	1,418,149	11,501	9,057
Hong Kong Exchanges	18,127,353	8,772,393	88,371	41,784	2,533,807	1,021,913	399,129	241,785	2,477	1,334
Korea Exchange	1,199	3,855	41	11	50	NA	NA	103	NA	0
National Stock Exchange India	5,214,191	5,224,855	44,079	40,265	21,549	24,181	4,478,610	4,550,367	1,254	1,100
Osaka SE	753,837	1,016,987	NA	NA	22,541	79,610	4,064	5,454	199	293
TAIPEX	1,089,158	1,018,917	32	79	2,797	3,959	45,088	126,245	31	161
Tokyo SE	190,876	201,789	21	33	39,428	11,906	NA	NA	21	33
Europe, Africa, Middle East										
Athens Derivatives Exchange	17,194	21,729	52	60	1,297	2,004	396	397	31	2
BME Spanish Exchanges	12,425,979	10,915,227	27,775	20,605	2,748,562	2,411,628	75,313	65,136	1,067	633
Borsa Italiana	16,056,751	12,439,716	91,803	67,776	1,964,411	1,646,014	475,942	442,151	2,771	1,979
Budapest SE	650	176	5	6	NA	NA	6	8	NA	NA
Euronex	272,543,852	255,918,793	964,997	752,454	52,089,911	53,312,856	NA	NA	59,236	38,740
EuronextLife	155,552,010	294,714,128	603,265	618,732	45,341,415	55,353,971	3,272,556	2,728,190	32,141	70,685
ISE	5,751,832	2,539,526	312	163	916,339	564,302	2,836	1,733	NA	NA
OMX	64,514,641	57,138,563	69,691	57,580	8,418,826	7,404,692	NA	NA	27,306	15,434
DAX Bors	5,811,946	3,325,368	NA	NA	616,315	364,265	34,135	NA	643	321
RTS SE	10,727,870	7,281,162	11,453	2,797	1,431,028	433,158	150,940	113,317	NA	NA
Warsaw SE	10,869	4,372	98	29	62	413	5,501	2,642	4	1
Wiener Börse	1,063,298	816,032	5,385	4,609	116,063	76,166	NA	NA	230	165
Total	2,653,601,416	2,311,714,514								

NA - Not Available
 - - Not Applicable

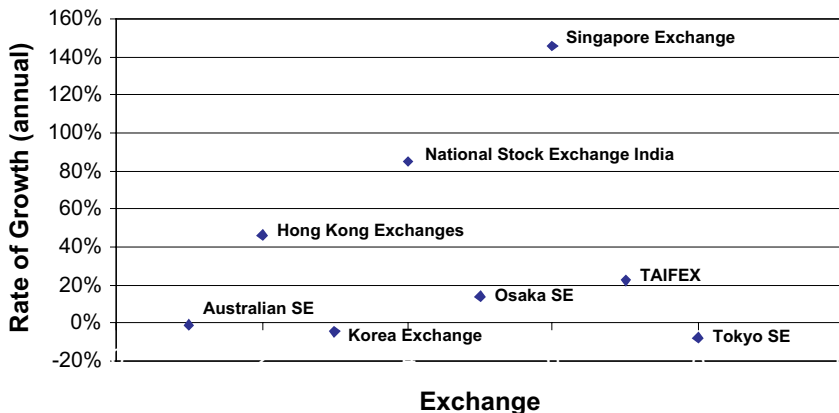
DERIVATIVES - 3.2 STOCK FUTURES

Exchange	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades	
Americas								
InterDer	3,000	19,400	211	85	0	3,400	621	17
Asia Pacific								
Australian SE	693,653	490,233	8,645	5,872	124,307	78,289	5,194	3,308
Bursa Malaysia Derivatives	958	-	4	-	0	-	NA	-
Hong Kong Exchanges	102,010	13,069	655	77	4,260	1,750	9,362	2,170
National Stock Exchange India	100,285,737	69,911,754	857,436	510,701	642,995	464,559	82,217,305	56,491,871
Europe, Africa, Middle East								
Athens Derivatives Exchange	2,476,487	1,431,514	5,543	3,160	116,576	124,815	285,982	167,715
BME Spanish Exchanges	21,229,811	18,813,689	43,266	31,708	1,649,184	1,921,717	139,441	119,499
Borsa Italiana	7,031,974	5,957,874	49,636	41,798	41,319	58,071	56,774	66,655
Budapest SE	918,426	740,394	9,052	7,842	65,015	24,336	92,618	81,468
Euronext	35,589,089	77,802	203,038	NA	1,459,509	58,107	NA	NA
Euronext.Liffe	29,515,726	12,158,093	344,198	64,062	1,489,169	487,117	22,948	21,006
JSE	69,671,751	24,469,988	26,288	10,223	12,027,716	1,535,839	392,154	177,766
OMX	8,459,165	5,659,823	6,128	NA	1,764,492	1,387,095	NA	NA
Oslo Bors	3,626,036	1,796,570	3,502	2,516	268,572	126,266	NA	NA
Warsaw SE	112,824	172,828	782	845	1,122	2,928	87,999	130,674
Wiener Borse	12,371	23,749	180	331	1,539	2,449	NA	NA
Total	279,730,018	140,736,581	-	-	-	-	-	-

DERIVATIVES - 3.3 STOCK INDEX OPTIONS

Exchange	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005
Americas										
American SE	184	10,000,480	8,876,804	18,801	6,505	NA	NA	120,598	109,214	NA
InterDer	928	228,204	167,003	4,401	3,315	108,607	38,350	748	699	NA
Shoos de Montreal	589	57,874	27,807	3,477	1,627	1,891	4,413	4,620	1,448	32
Chicago Board of Trade (CBOT)	243	591,150	728,569	NA	NA	21,413	2,330	NA	NA	NA
Chicago Board Options Exchange (CBOE)	43	219,008,803	186,139,401	17,987,759	11,541,817	37,749,429	29,387,748	17,490,000	7,432,423	212,207
Chicago Mercantile Exchange (CME)	213	217,226,613	18,186,163	8,009,298	3,250,454	1,627,029	1,258,411	3,948,448	1,487,078	NA
International Securities Exchange (ISE)	63	8,312,413	4,498,004	NA	NA	NA	NA	NA	NA	NA
MetLife	217	117,988	37,344	20,110	5,044	3,985	3,488	959	469	NA
New York Board of Trade (NYBOT)	27	199,259	217,591	NA	NA	8,105	10,509	NA	NA	NA
Philadelphia SE	22	7,626,367	6,238,802	NA	NA	NA	NA	NA	NA	NA
San Paolo SE	192	1,816,794	2,257,258	4,800	3,273	146,937	146,008	537,007	557,008	4,500
Europe, Africa, Middle East										
Australian SE	25	1,500,884	1,844,000	198,089	94,268	137,643	189,230	60,037	692,420	2,098
Borsa Italiana	49	4,979,293	3,397,229	9,907	294,319	359,988	229,609	1,097,223	729,411	NA
Korea Exchange	49	243,422,265	2,326,201,003	41,208,408	34,652,518	3,448,456	3,299,722	NA	87,656,008	152,013
National Stock Exchange India	63	18,125,248	10,140,208	148,113	16,027	154,610	46,127	6,448,608	2,740,461	2,811
Osaka SE	13	28,211,769	24,894,023	NA	NA	698,581	1,180,453	1,598,319	119,841	24,502
Singapore Exchange	16	69,073	139,742	26,111	30,308	6,498	27,452	NA	NA	NA
TAIFEX	23	95,910,004	81,931,102	2,452	20,367	677,180	79,819	18,844,128	15,559,460	21,648
Tokyo SE	4	18,364	20,004	2,352	2,102	2,178	3,005	NA	NA	118
Asia Pacific										
Athens	4	670,583	700,004	8,674	7,314	11,340	10,303	74,996	73,303	161
BME Spanish	23	5,745,467	4,487,488	62,268	62,423	1,248,688	882,458	222,878	86,498	2,247
Borsa Italiana	39	2,319,914	2,519,803	331,862	250,471	133,854	120,008	149,422	576,500	1,252
Bors	49	217,232,249	140,389,589	9,586,257	5,272,408	23,529,972	24,898,598	NA	NA	244,120
JSE	2	11,600,000	11,000,000	8,896	7,098	1,249,728	1,512,038	19,696	10,000	NA
OMX	11	11,813,270	12,220,149	188,365	147,281	885,814	979,371	NA	NA	23,879
Oslo Bors	19	3,206,661	1,516,838	NA	NA	44,126	21,409	NA	NA	178
San Paulo SE	19	75,536,100	63,130,416	1,427,043	964,407	438,340	341,240	12,917,880	9,640,122	15,627
Warsaw SE	27	318,840	260,000	3,005	1,304	4,347	6,442	117,288	63,834	46

2006 Option Trading Volume Growth: Asia



DERIVATIVES - 3.4 STOCK INDEX FUTURES									
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		
Americas									
BMF&F	16,940,891	6,683,525	293,433	207,990	178,243	301,590	1,464,734	803,605	
Bourse de Montréal	3,096,659	2,258,404	370,621	245,880	166,640	110,400	1,743,005	1,025,432	
Chicago Board of Trade (CBOT)	28,730,906	26,679,733	NA	1,501,704	167,040	97,208	NA	NA	
Chicago Mercantile Exchange (CME)	470,196,436	378,748,159	29,270,013	22,578,526	47,144,863	41,786,549	145,708,814	122,479,477	
MaxDer	620,557	410,561	132,292	61,413	30,859	22,130	33,739	24,244	
New York Board of Trade (NYBOT)	860,539	922,099	NA	NA	71,698	92,483	NA	NA	
Asia Pacific									
Australian SE	6,652,323	5,715,161	613,940	451,370	268,688	175,548	1,459,407	1,155,270	
Bursa Malaysia Derivatives	1,628,043	1,111,575	21,153	13,210	24,621	17,814	NA	NA	
Hong Kong Exchanges	19,747,245	13,393,462	2,014,834	987,256	185,262	136,465	9,443,472	6,338,936	
Korea Exchange	46,696,151	43,912,281	4,283,838	2,982,607	91,200	83,419	NA	13,557,429	
National Stock Exchange India	70,286,227	47,375,214	515,354	279,775	307,761	234,624	18,792,431	12,771,115	
Osaka SE	31,661,331	18,070,352	3,560,098	2,068,205	388,666	408,598	3,025,602	949,211	
Singapore Exchange	31,200,243	21,725,170	1,660,847	1,088,947	439,159	411,556	NA	NA	
TAIFEX	13,930,545	10,104,645	519,019	688,666	66,980	63,667	16,864,405	8,464,444	
Thailand Futures Exchange (TFEX)	186,737	-	2,595	-	7,601	-	111,214	NA	
Tokyo SE	14,907,723	12,788,102	2,074,924	1,510,707	389,690	385,914	NA	NA	
Europe, Africa, Middle East									
Athens Derivatives Exchange	2,634,245	2,521,790	37,971	27,724	16,159	18,727	454,205	380,035	
BME Spanish Exchanges	8,007,257	6,081,276	1,012,015	615,976	86,067	75,600	2,889,250	1,993,831	
Borsa Italiana	5,697,622	4,875,301	1,041,826	777,839	15,470	26,348	3,783,954	2,986,677	
Budapest SE	1,679,064	529,563	7,313	5,222	68,747	4,307	303,932	182,057	
Euronex	270,134,951	194,495,160	18,565,389	10,851,303	2,790,632	2,186,813	NA	NA	
EuronextLiffe	72,135,006	56,092,515	6,318,763	4,154,454	1,166,209	1,027,559	18,101,967	13,122,326	
JSE	15,506,101	10,663,676	398,761	224,904	296,485	289,601	301,305	445,755	
OMX	24,374,765	20,259,025	329,352	NA	551,424	504,697	NA	NA	
Oslo Bors	2,437,118	962,911	19,616	8,245	56,943	13,665	22,816	NA	
Tel Aviv SE	32,474	13,460	589	219	2,682	2,315	219	71	
Warsaw SE	6,257,203	5,167,111	59,920	34,864	72,706	30,348	2,121,215	1,437,611	
Wiener Börse	154,521	104,677	13,533	6,981	17,046	13,260	NA	NA	
Total	1,166,696,884	881,260,593	-	-	-	-	-	-	-

DERIVATIVES - 3.5 SHORT TERM INTEREST RATE OPTIONS									
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		Option Premium (USD millions)
Americas									
BMF&F	10,554,948	3,052,800	11,195	20,840	2,354,423	697,304	12,853	9,855	NA
Bourse de Montréal	605,806	377,370	536,720	311,501	78,861	44,373	2,084	1,476	92
Chicago Board of Trade (CBOT)	9,424,628	6,534,587	NA	32,672,935	1,130,942	927,916	NA	NA	NA
Chicago Board Options Exchange (CBOE)	2,594	4,381	13	14	343	317	288	577	1
Chicago Mercantile Exchange (CME)	268,937,139	188,031,096	268,937,127	188,001,090	16,808,764	16,325,364	1,140,862	951,078	NA
Asia Pacific									
Australian SE	206,853	247,790	156,487	188,719	59,544	54,132	382	425	NA
Singapore Exchange	6,700	-	7,691	0	8,700	0	NA	0	NA
Tokyo Financial Exchange	3,976,697	41,294	3,418,070	37,171	481,355	32,500	NA	NA	NA
Europe, Africa, Middle East									
EuronextLiffe	92,885,715	79,482,008	104,878,071	89,052,367	10,367,369	9,586,715	65,326	76,311	NA
OMX	65,000	-	NA	-	67,000	-	NA	-	-
Total	386,818,680	277,741,236	-	-	-	-	-	-	-

NA - Not Available
-- Not Applicable

DERIVATIVES - 3.6 SHORT TERM INTEREST RATE FUTURES									
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		
Americas									
BMF&F	180,822,732	143,895,871	7,353,654	5,338,229	9,784,628	7,332,556	595,048	486,397	
Bourse de Montréal	16,702,302	11,157,288	14,770,015	9,209,807	393,078	331,916	825,430	724,190	
Chicago Board of Trade (CBOT)	17,833,331	11,802,282	NA	58,011,410	414,975	455,444	NA	NA	
Chicago Mercantile Exchange (CME)	503,729,899	411,706,656	505,339,873	413,781,671	8,554,114	8,596,023	60,357,744	52,168,804	
MaxDer	267,450,231	104,339,918	28,564,227	10,346,810	44,058,415	21,205,607	65,227	48,623	
Asia Pacific									
Australian SE	22,860,491	18,199,674	19,823,462	15,665,366	902,367	760,267	250,184	236,341	
Bursa Malaysia Derivatives	272,302	162,262	74,545	0	42,863	59,801	37,968	NA	
Hong Kong Exchanges	14,043	25,181	2,171	3,877	1,532	1,477	752	1,228	
Korea Exchange	615	3,308	187	622	NA	NA	NA	163	
Singapore Exchange	3,573,665	2,890,729	2,915,805	2,466,068	288,215	415,431	NA	NA	
TAIFEX	46	217	138	110	310	0	72	217	
Tokyo Financial Exchange	31,495,084	10,977,981	27,070,811	9,903,104	2,336,719	1,418,937	NA	NA	
Europe, Africa, Middle East									
Budapest SE	2,500	1,390	12	3	0	500	5	16	
Euronex	767,458	688,831	937,064	833,748	48,207	37,838	NA	NA	
EuronextLiffe	296,098,444	248,662,863	341,274,218	280,316,062	6,092,072	5,242,458	32,413,840	25,668,450	
JSE	667	0	NA	NA	63	0	NA	NA	
OMX	6,170,853	6,315,805	NA	NA	526,914	345,833	NA	NA	
Total	1,349,704,857	976,396,236	-	-	-	-	-	-	-

DERIVATIVES - 3.7 LONG TERM INTEREST RATE OPTIONS

Exchange	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		Option Premium (USD millions)	
Americas										
Bourse de Montréal	2,275	7	202	0	0	2	25	NA	0	NA
Buenos Aires SE	8,437	86,038	NA	NA	0	293	NA	NA	1	5
Chicago Board of Trade (CBO)	95,737,950	89,888,554	NA	8,931,118	3,097,170	2,517,938	NA	NA	NA	NA
Chicago Board Options Exchange (CBOE)	18,736	61,245	92	265	2,038	7,465	1,318	5,203	5	13
Asia Pacific										
Australian SE	3,086,456	2,307,659	235,067	175,753	14,733	1,729	11,078	10,494	NA	NA
Singapore Exchange	0	725	0	308	NA	NA	NA	NA	NA	NA
Tokyo SE	2,060,524	1,899,037	NA	2,120,803	16,987	22,939	NA	NA	4,306	3,222
Europe, Africa, Middle East										
Eurex	76,328,806	58,551,836	10,870,919	8,449,133	1,786,810	1,405,448	NA	NA	NA	NA
JSE	2,785	4,831	NA	11	NA	NA	NA	79	NA	NA
Total	177,246,085	152,989,930	-	-	-	-	-	-	-	-

DERIVATIVES - 3.8 LONG TERM INTEREST RATE FUTURES

Exchange	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades	
Americas								
BM&F	67,301	16,172	4,214	1,484	1,731	181	1,102	307
Bourse de Montréal	7,777,098	4,824,924	695,280	398,274	337,120	166,504	1,005,657	772,125
Chicago Board of Trade (CBO)	512,163,874	446,068,592	NA	46,723,075	5,035,467	3,614,314	NA	NA
MeaDer	500,479	284,460	52,437	27,750	43,450	2,101	2,584	1,402
Philadelphia SE	10	-	NA	-	0	-	10	-
Asia Pacific								
Australian SE	45,121,853	36,255,583	3,413,538	2,761,260	872,581	593,812	671,133	655,235
Bursa Malaysia Derivatives	28,181	27,068	771	715	0	150	NA	NA
Hong Kong Exchanges	0	1,250	0	169	0	NA	0	50
Korea Exchange	10,348,884	11,223,811	1,180,451	1,208,118	112,852	81,407	NA	1,838,183
Singapore Exchange	1,427,462	1,241,852	116,352	105,758	40,186	27,645	NA	NA
TAIFEX	40,675	2,887	6,745	1,045	258	22	51,878	2,348
Tokyo Financial Exchange	13,680	78,943	1,176	7,122	300	1,450	NA	NA
Tokyo SE	12,149,979	9,844,617	10,357,258	8,881,028	131,772	116,664	NA	NA
Europe, Africa, Middle East								
BME Spanish Exchanges	15	46	2	6	1	2	8	22
Budapest SE	2,500	-	12	-	0	-	5	-
Eurex	654,119,660	599,621,461	92,905,934	85,843,727	3,796,014	3,357,373	NA	NA
EuronextLiffe	23,245,504	19,078,373	4,356,744	3,468,410	360,521	292,141	2,059,645	2,002,722
JSE	8,947	10,362	NA	NA	63	0	NA	NA
OMX	4,354,311	3,097,742	NA	NA	184,780	140,258	NA	NA
Tel Aviv SE	25,005	-	662	-	681	-	1,985	-
Warsaw SE	12,875	32,362	431	1,028	50	58	164	484
Total	1,271,406,293	1,131,707,505	-	-	-	-	-	-

NA : Not Available
 -- : Not Applicable

DERIVATIVES - 3.9 CURRENCY OPTIONS

Exchange	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades	Option Premium (USD millions)
Americas								
Bourse de Montréal	31,262	7,264	277	70	2,838	2,891	2,010	468
BM&F	10,525,832	6,850,041	44,173	36,604	927,188	799,576	30,110	28,340
Chicago Mercantile Exchange (CME)	3,269,498	3,182,323	451,886	440,563	230,420	228,288	682,415	609,974
MeaDer	305	0	34	0	2	0	9	0
New York Board of Trade (NYBOT)	44,322	35,970	NA	NA	3,690	1,778	NA	NA
Options Clearing Corp.	0	0	NA	NA	10,602	17,330	NA	NA
Philadelphia SE	131,508	159,748	149	166	10,476	17,213	6,370	8,861
Europe, Africa, Middle East								
Budapest SE	1,022,457	258,000	1,303	251	25,500	86,700	1,050	209
EuronextLiffe	733,039	403,957	9,056	4,728	52,150	42,240	17,712	23,871
Tel Aviv SE	7,447,717	6,937,575	74,820	69,802	224,904	217,476	335,782	270,799
Total	23,225,941	17,835,080	-	-	-	-	-	-

NA : Not Available
 -- : Not Applicable

DERIVATIVES - 3.10 CURRENCY FUTURES									
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		
Americas									
BMF&F	1,726,351	1,293,181	2,738,810	1,737,251	877,724	475,755	1,726,351	1,289,181	
Buenos Aires SE	800	2,416	1	2	NA	NA	NA	NA	
Chicago Mercantile Exchange (CME)	110,338,043	81,105,391	13,399,645	9,798,905	1,098,880	711,360	65,453,858	53,154,207	
ROFEX	17,836,247	12,932,275	NA	NA	196,293	323,189	NA	NA	
MaxDer	6,077,409	2,934,793	670,393	323,969	248,205	138,992	4,115	2,765	
New York Board of Trade (NYBOT)	3,653,024	3,604,877	NA	NA	149,595	127,497	NA	NA	
Asia Pacific									
Australian SE	1,363	4,422	103	337	0	37	370	988	
Korea Exchange	3,158,049	2,667,005	158,463	133,678	160,722	85,520	NA	633,514	
Tokyo Financial Exchange	0	600	0	5	NA	NA	NA	NA	
Europe, Africa, Middle East									
Athens Derivatives Exchange	84	21,844	7	1,892	0	80	3	3,851	
Budapest SE	10,857,327	7,742,408	14,535	10,698	301,032	406,942	30,281	19,790	
EuronextLiffe	8,807	7,435	216	176	1,043	518	1,221	1,510	
Turkish Derivatives Exchange	4,588,416	1,603,797	NA	1,663	170,431	134,063	NA	NA	
Warsaw SE	3,144	6,218	34	65	88	88	2,579	5,184	
Total	198,359,064	113,926,650	-	-	-	-	-	-	-

NA : Not Available
- : Not Applicable

DERIVATIVES - 3.11 COMMODITY OPTIONS									
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	
	Volume Traded (Nber of contracts)		Notional Value (USD millions)		Open Interest (Nber of contracts)		Number of Trades		Option Premium (USD millions)
Americas									
BMF&F	177,719	195,103	194	194	12,541	5,999	1,354	1,560	NA
Chicago Board of Trade (CBOT)	21,861,340	16,353,955	NA	304,650	2,177,795	900,266	NA	NA	NA
Chicago Mercantile Exchange (CME)	2,010,226	943,377	67,569	34,008	307,489	116,431	470,808	388,526	NA
Mercado a Término de Buenos Aires	2,815,000	2,091,500	NA	NA	NA	NA	NA	NA	NA
New York Board of Trade (NYBOT)	11,662,056	8,663,470	NA	220,560	1,146,100	928,436	NA	NA	NA
NYMEX	54,468,396	38,002,895	NA	2,193,391	9,297,986	NA	NA	NA	NA
ROFEX	34,815	59,475	NA	NA	6,039	4,705	NA	NA	NA
Asia Pacific									
Australian SE	10,683	558	380	72	21,264	389	488	49	NA
Tokyo Grain Exchange	27,262	27,101	NA	42	409	289	284	49	NA
Europe, Africa, Middle East									
Budapest SE	832	40	13,42	0	260	98	29	3	NA
EuronextLiffe	727,190	444,754	271	226	136,475	60,129	9,267	7,056	21
ICE Futures	138,129	118,476	NA	NA	23,967	5,832	NA	NA	NA
JSE	512,518	451,885	1,898,026	337,671	46,568	57,560	52,749	40,655	NA
London Metal Exchange	8,412,350	8,184,187	NA	468,446	1,007,248	757,837	NA	NA	6,716
Total	102,858,516	75,538,786	-	-	-	-	-	-	-

NA : Not Available
- : Not Applicable

DERIVATIVES - 3.12 COMMODITY FUTURES									
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		
Americas									
BMF&F	1,318,203	1,073,471	12,436	10,108	63,964	50,996	219,847	214,280	
Chicago Board of Trade (CBOT)	118,719,938	78,788,964	NA	1,280,074	2,821,951	1,732,853	NA	NA	
Chicago Mercantile Exchange (CME)	17,448,155	11,598,317	613,145	394,707	536,649	387,575	5,079,223	4,212,551	
Mercado a Término de Buenos Aires	11,899,472	11,562,286	NA	NA	NA	NA	NA	NA	
New York Board of Trade (NYBOT)	28,233,129	24,488,440	NA	500,155	1,065,666	901,038	NA	NA	
NYMEX	178,929,185	166,608,842	NA	8,893,687	9,326,151	NA	NA	NA	
ROFEX	116,937	118,973	NA	NA	11,984	10,408	NA	NA	
Asia Pacific									
Australian SE	185,349	36,481	3,321	1,160	55,600	18,010	12,295	6,150	
Bursa Malaysia Derivatives	2,230,340	1,158,510	48,051	21,313	74,587	28,918	NA	NA	
Central Japan Commodity Exchange	9,019,416	33,179,422	NA	1,843,220	117,816	182,304	NA	NA	
Dalian Commodity Exchange	117,681,038	89,174,714	NA	822,949	1,154,982	482,978	NA	NA	
Korea Exchange	3,158,049	2,667,005	158,463	133,678	160,722	85,520	NA	NA	
Shanghai Futures Exchange	58,106,001	33,789,754	NA	515,274	196,219	154,723	NA	NA	
TAIFEX	35,027	0	2,206	0	44	0	12,734	0	
Tokyo Grain Exchange	19,106,247	25,573,238	1,302,452	406,973	438,435	583,665	NA	NA	
Zhengzhou Commodity Exchange	46,258,117	28,472,570	NA	16,168	213,847	452,098	NA	NA	
Europe, Africa, Middle East									
Budapest SE	8,750	778	140	9	1,093	601	1,856	1,889	
EuronextLiffe	9,124,195	8,054,118	119,436	85,794	449,829	419,333	1,257,639	906,230	
ICE Futures	92,552,821	41,938,809	NA	NA	1,389,616	642,753	NA	NA	
JSE	1,436,155	1,335,964	1,864,750	15,158,450	43,295	51,296	206,430	199,787	
London Metal Exchange	78,527,839	70,444,685	7,148,569	4,045,775	1,515,663	2,411,870	NA	NA	
Total	794,164,463	627,358,969	-	-	-	-	-	-	-

NA : Not Available
- : Not Applicable

Summary

The last three decades have witnessed a proliferation of financial innovations. Roughly speaking, financial innovations seem to belong to two classes.

First, there are the new securities and their markets such as traded and OTC equity and interest rate derivative assets. Second, there are dynamic trading strategies using these instruments. Traded derivative assets are standardized contracts which are listed on options exchanges. OTC derivative assets are tailor-made to the investor's needs and are often written by investment banks. Examples of classic or standard financial assets and commodity contracts include forward rate contracts, futures contracts, swaps, standard calls and puts, traded stock options, equity warrants, covered warrants, options on equity indices, options on index futures contracts, options on currency forwards or currency futures and bond options. Futures and options market enable investors to manage price risk. The market offers an environment that allows all users to control the price risk. The prices of these financial instruments are fully transparent because they are updated second by second as trading occurs. Examples of commodity contracts are oil and cocoa. The oil market is ultimately concerned with the transportation, processing, and storage of a raw material. Crude oil is traded on world markets using the spot asset, physical forward contracts, futures contracts, options on futures contracts, swaps, warrants, etc. Price information can be obtained from oil and energy pricing information such as Reuters, Bridge Telerate, Platt's, etc. The size and complexity of global crude oil trade are unique among physical commodities. Worldwide crude oil trade in the last 30 years has gone through revolutionary changes that have had large political and economic impact adding to its uniqueness. Each crude oil from each field is unique in quality. The trading instruments apply to some crudes including West Texas Intermediate (WTI), Dubai, Alaska North Slope (ANS) and Brent blend. Each of these crudes or blends define its specific oil market. However, the markets are linked together through arbitrage. The Brent market includes partial forward transactions, a futures contract traded in London at the International Petroleum Exchange (IPE), options on this contract and swap deals. The history of cocoa dates back to the 6th century with its origins in the Amazon Basin. It was first brought to Europe in the 17th century as a luxury drink. Market users include the international cocoa trade, cocoa processors and chocolate manufacturers, managed futures funds, institutional investors and options specialists. Full cocoa-related statistics

are published in the “*Quarterly Bulletin of Cocoa Statistics*” in the ICCO publications. For example, the estimate of world cocoa-bean production for the 1996/1997 cocoa year is 2,695,000 tonnes, down 20,000 tonnes from the figure in the June 1997 Newsletter. World grindings of cocoa beans in 1996/1997 were estimated at 2,815,000 tonnes, representing an increase of 12,000 tonnes compared with the previous forecast. The information concerns the gross crop, the net crop, grindings, surplus/deficit, total stocks, and free stocks. The cocoa futures contract was originally launched in 1928. The cocoa traded options contract was launched in 1987 as a means of offering market participants even greater flexibility and choice in their underlying activities. These contracts are traded in London (LIFFE). Index options on stock indices and stock index futures began trading in the United States in 1983 with the introduction of the S&P 100 contract on the Chicago Board Options Exchange. There are several types of bonds and bond options traded in organized and OTC markets. They include zero-coupon bonds, bonds with call provisions, puttable bonds, convertible bonds, bonds with warrants attached, exchangeable bonds, etc. The futures contract is marked-to-market at the end of each trading day and is subject to interim cash flows. The main difference between futures contracts and forward contracts is that forward contracts are OTC instruments which are nonstandardized and are subject to counter-party risk. There are several traded interest rate futures contracts. Financial assets may appear in non-standard fashion, i.e., they can be tailor-made and their pay-offs may be path-dependent or path-independent. A path-dependent contingent claim is an option whose pay-off depends on the history of the underlying asset price. In general, an upward movement of the underlying asset price followed by a downward movement is different from a downward movement followed by an upward movement. This is a main property of path-dependent options. For path-independent contingent claims, an upward movement of the underlying asset price followed by a downward movement is equivalent to a downward movement followed by an upward movement. Examples of non-standard financial assets include forward start options, pay-later options, chooser options, options on the minimum or the maximum of several assets, two-color rainbow options, options with extendible maturities, ratio options, exotic options, barrier options, Asian options, partial and full lookback options and more structured products with embedded digitals such as rebate range binaries, mandarin collars, mega-premium options, and limit binary options. Several authors proposed different explanations for the development of these markets and the proliferation of the new

financial instruments. For example, according to Ross (1989), the existence of new financial instruments and strategies and the marketing process are based on the cost structure of the marketing networks and distribution channels. It is the institutional structure of contracts and incentives that allows the process of financial engineering to continue. Hence, it seems that institutional markets and financial marketing are central to the understanding of financial innovations.

Questions

1. What are the specific features of options?
2. What are the specific features of futures and forward contracts?
3. What are the trading characteristics of commodity contracts?
4. What are the specific features of the main instruments traded on the International Petroleum Exchange?
5. Describe the specific features of the cocoa market.
6. Describe the specific features of equity options.
7. Describe the specific features of options on currency forwards and futures.
8. Describe the specific features of bonds and bond options markets.
9. Provide some examples of simple and complex financial instruments.
10. Why there are so many new financial instruments?
11. What are the fundamental reasons behind the proliferation of financial assets?
12. Why has the wave of financial innovation not stopped?

Exercises

1. *Explain how an investor uses options.*

- Options are easily bought and sold.
- Holders can sell or exercise their options at any time.
- Most options are traded on exchanges and/or on over the counter.
- At maturity, holders of physical options exercise into actual shares.
- Holders of cash-settled options choose to sell their options.
- They involve the purchaser in completing options counterparty documentation.

2. Explain why institutions and individuals use options.

Institutional and individual investors use options to achieve an astonishingly broad spectrum of goals, such as hedging, arbitrage and speculation. Options can be used in several strategies:

- Aggressive strategies
- Leveraged strategies
- Protect an existing portfolio
- Combinations where cash spent is recouped by interest. This prevents from putting capital at risk, etc.

3. Explain exchange traded or listed options and the role of the clearing house.

Options are exchange traded contracts (or OTC contracts) for making economic commitments based on the shifting values of stock prices, indices, etc.

The *clearing house* interposes itself in all transactions as the buyer to every seller and the seller to every buyer, so every party is free to liquidate his position at any time by making an offset closing transaction.

A committee charged with developing new financial instruments can submit the proposal. Then, we wait for the approval.

4. Provide historical reasons for the development of the option market.

The idea of stock options was borne in 1972.

The idea of index options and futures was born in 1977.

After the success of the initial 'covered market' (exercise against shares), banks issued options without having an underlying corporate to provide the hedge.

New issues of options can also be cash settled at maturity.

The market today provides a range of exposures on most of the world's significant equity markets.

In many markets, *local authorities are actively fostering options* development.

The market today provides options which are highly liquid. For options and warrants, the market provides liquid and less liquid warrants and exotic warrants in emerging markets.

5. What is the appropriate definition of an option?

Options can be calls or puts.

A call gives the buyer the right, but not the obligation to exercise, and thereby receive in cash or physical delivery any amount by which the underlying asset is above the strike price.

A *put* gives the buyer the right, but not the obligation to exercise, and thereby receives in cash or physical delivery any amount by which the underlying asset is below the strike price.

European options are only exercised at maturity.

American options are exercised at any time before maturity.

6. How is an option exercised?

An option entitles the right and not the obligation to buy or sell the underlying. This right has value.

A call entitles the right to the holder to buy the underlying asset.

A put entitles the right to the holder to sell the underlying asset.

Options give the holder the right to buy or sell a specific asset at a fixed price on or before a given expiry date.

If the right is exercised at any time, this is an American type option.

If the right is exercised at maturity, this is a European type option.

The **value in cash** (received or stock) corresponds to the exercise value.

Options with exercise value are said to be in the money.

Options with no exercise value are out of the money.

Options for which the strike price is equal to the underlying asset price is at the money.

7. What happens for buyers and sellers among exercise?

For the option buyer, exercise is a right, not an obligation.

Sellers have an unconditional obligation to respond whenever the buyer chooses to exercise. It may seem that the buyer has all the advantages, and that the seller assumes nothing but liabilities. That is why the buyer has to pay the seller for the option.

The buyer must pay cash to the seller for the option's full price.

Since this is the maximum amount the buyer can lose in a transaction, he is not required to pay any additional security as margin.

The seller, on the other hand, *must post margin* with the *clearing house* as a performance bond or calculated by *a formula* based on the relationship of the asset price and the strike price.

The seller may be required *to deposit* additional margin if his position moves against him.

Options can be exercised in cash against the closing price of the underlying asset (compared with the strike price).

They can be exercised also with the requirement of *transferring actual shares* of stock.

8. *How can options be used?*

- Options can be used as an alternative means of implementing different strategies investors execute directly in the stock market, but with enhanced performance and reduced transaction costs.
- Options can be used to structure unique patterns of risks and returns that would have been impossible without them.

The cost of an option is significantly less than the price of the underlying asset.

This allows for **leverage (or Gearing)**, of the option.

(The underlying asset of the option is a single stock, a basket of stocks, an equity index, a currency, etc.)

Options can be exercised and settled physically in return for the physical shares.

Options can be exercised and settled **in cash** for an amount equal to their intrinsic value.

9. *How is each option contract specified?*

In selecting the contract that best suits the investment applications, investors can sort through a variety financial instruments: calls, puts, European and American options.

Each contract is specified by:

- A contract multiplier: the value times which the contract price is multiplied to determine its total value;
- Minimum fluctuation: the smallest permissible increment of price change;
- Expiration terms dates for expiration;
- Trading hours;

- Position limits: the maximum number of contracts the exchange will permit an investor to control.

Investors can contact brokers and the exchanges to obtain the current specifications.

10. *Describe cash and margin requirements.*

Buyers pay the *full dollar value* of their contracts.

The buyer is never required to *deposit additional* funds if the position moves against him.

The option seller is obliged to pay the difference between the option's strike price and the underlying, a good-faith deposit of cash or securities ensure eventual performance. This is the case for cash settled options.

For traditional stock market trading, the term 'margin' suggests a down payment on the full value of securities purchased, with the brokerage firm loaning the investor the balance.

For options, the exact amount of margining to be deposited must be determined.

Margins can also be different between speculators and hedgers.

The margin, for example, for stock (index) options may be a % of the underlying stock (index) plus the option price.

Margin requirements can be recalculated each day on a mark-to-market basis.

If subsequent calculations show higher requirements, the seller must deposit additional margins.

11. *Should investors pay transaction costs?*

Any time investors trade securities they pay *two types of transaction costs*.

First, they pay an *explicit commission* to a broker for executing and **clearing** the trade.

Second, they pay an **implicit market impact cost** because their bids will inevitably drive prices higher when they wish to buy and their offers will drive prices marginally lower when they wish to sell.

Commissions are negotiable between the investor and the broker.

Like stocks, options commissions are charged on a one way basis.

12. What about tax treatment?

Profits and losses from trading can be treated as long term capital gains or losses and short term capital gains or losses.

13. What about trading orders?

In many ways, trading options is just like trading stocks. Trading orders most commonly used reflect:

- Time duration;
- Good-Til Canceled (or open); and
- Opening only.

14. What are price specifications?

Can include:

- Limit order (maximum purchase price);
- Discretion or limit order;
- Delta;
- Market order;
- Market on close order; and
- Market if touched.

15. What are contingencies?

- Contingent: a contingent order is in effect when a specified condition is satisfied;
- Stop order; and
- Stop limit.

16. What are special instructions?

- Immediate or cancel;
- All or none; or
- Fill or Kill.

17. Explain cancellations.

- Straight cancel;

- If nothing done cancel; or
- Cancel former order.

18. *How are contracts exercised and assignments conveyed?*

Orders to exercise must be tendered in writing to the exchanges by a member firm no later than the close of trading on the day of the exercise.

Brokerage firms may apply earlier cutoff times for receipt of oral exercise instructions from their customers.

At expiration, long customer positions in the money are automatically exercised.

Once a contract has been exercised, the clearing corporation assigns it by random lottery among the universe of member brokerage firms carrying matching short positions.

Assignment notices are generally conveyed to customers before the opening of the trading on the market day following the exercise date.

19. *Explain the world of floor traders.*

Floor traders are of two basic breeds: *market makers and floor/brokers*.

Floor brokers act as agents executing orders in the crowd on behalf of others.

They earn their livelihoods by **collecting commissions** on the trades they execute. Their income is determined by the volume of transactions they complete.

Market makers put **their own capital at risk in the trading**. Their only source of income is the profit they can derive from their trading and their only limit is the risk they are willing to bear.

Before the exchanges admit a new trader as a member, they investigate his background and administer a test.

20. *What are some floor strategies?*

The scalpers: They exploit the fact that the price of any traded asset is quoted as a two sided market comprised of the highest bid and the lowest offer.

They will simultaneously make bids and offers, indifferent to whether they end up buying or selling. Their concern is that whenever they buy, they buy on the bid side of the market, and whenever they sell, they sell on the offer side of the market, thus their profit earned is the differential between the two.

The shooter: He is another type of market maker who tries to make purchases at the bid and sales at the offer. Unlike the scalper, he is willing to inventory positions in anticipation of market moves. The shooter is in the game for the big score.

The spreader: He seeks out and exploits minute inefficiencies in the pricing structure of the options markets.

21. Describe a day of trading and how the exchange works.

The **clearing houses** accept as only firms that demonstrate substantial financial **strength** and business integrity members.

They maintain elaborate safeguards against defaults, including special funds to be used in the event of losses, to which member firms must contribute.

The process of determining the opening price is an unstructured negotiation that begins several minutes before the official opening.

Market makers provide the prices.

Exchange employees called pit observers report the transactions to terminal operators who disseminate the transactions to quotation services around the world.

Discipline in the pit is provided by pit observers who monitor trading activity for accuracy and fairness throughout the day.

Public orders are handled by floor brokers.

Market continuity is provided by the presence of competing market makers.

In other markets, a **staff of exchange employees** maintains a **public book** of limit orders.

Customer market orders can be put in computer that randomly assigns them to participating market makers and reports the trades instantaneously. New technologies are used and are integrated into the stock exchange trading process.

Appendix

Derivatives Markets in the World Before and During the Financial Crisis

Stock Options, Index Options, Interest Rate and Commodity Options and Futures Markets

Global overview

Several institutions produce information regarding futures and options around the world.

Often, summary statistics on volume and open interest are given for futures and index options.

Index options on stock indexes and index futures contracts begin trading in the U.S in 1983. This has been facilitated with the introduction of the SP 100 index contract on the Chicago Board Options Exchange. Today, index futures are traded and are more liquid than index options.

The main indexes around the world: a historical perspective

The first options traded on indexes can be traced back to US (SP 500 and SP 100 in 1983), Japan (Nikkei 225 in 1989), UK (FT-SE 100 in 1984), France (CAC 40, 1989), Germany (DAX, 1991), Switzerland, (SMI, 1980), Canada (TSE35, 1987), Netherlands (EOE, 1978), Australia (All Ordinaries, 1983), . . .

Options volume in listed markets is mostly concentrated in one month contracts in all markets. For most options, volume with longer maturities take place in OTC markets.

In the OTC market, trading began early in 1988. Several investors buy long-term puts to implement portfolio insurance strategies.

Today, dealers run large OTC options books. This can reduce or eliminate risk in the market.

North America.

U.S index options trading appear on listed markets and OTC markets with customized features.

Options are traded on SP 100, SP 500, MMI, SPMidCap, options on small capitalization indexes, the NYSE Composite index.

Main information used concerns the average daily volume, Average daily dollar volume (in millions) and Index level.

Options on SP are preferred by retail investors.

MidCap Options and options on SP 500 index attract the interest of institutional money managers and pension funds.

SP 100 are the mostly traded contracts in the U.S.

SP 500 are the have the greatest open interest in the U.S.

Hundred billions of dollars are traded.

Institutional use of index options:

Covered call writing: a call is sold and the underlying asset is held, Long index put strategy and collar positions, which is preferred by institutions. The collar can lead to a skew in index options implied volatilities: out of the money puts have higher volatilities than calls. Options are available on National OTC (PHX) indexes.

Stock index markets in North America:

The SP 500 index fluctuated in a band. The move gives a volatility in a range of 10%–25%. We can represent a monthly volatility for the year. With its heavier dose of cyclical stocks, the DJIA has been outperforming for some years the broader market.

We can compute historical volatility and implied volatility from at the money options. We should compute the spread.

The following Tables shows the volume (number of contracts traded) in several countries.

Japan.

Options exist on Osaka Nikkei, options on TOPIX.

Japanese institutions often use for their long term options exposure or customized strike prices fixed income securities with embedded index options.

Osaka Nikkei options are used by domestic institutional in short term trading. Regulations by the Ministry of Finance prevent pension funds from completely hedging their portfolios (hedging limit 50%).

Hedgers integrated their activities into equity risk management systems.

Life insurance companies focus on using options for directional trading. Offshore hedge funds use the Osaka Nikkei options to take outright short-term trading positions.

The Government intervenes to support the market. Foreign institutions act in the OTC market for different reasons:

They are restricted by regulation from trading listed options.

They do not want to incur the costs of rolling over.

Competition among dealers makes this market very competitive.

Sector options are popular in Japan. The following Table provides the volume (number of contracts traded) in several countries for index options.

Stock index options

Exchange	2004		2003
	Volume Traded (Nber of Contracts)		
Americas			
American SE	40,985,108	33,137,709	123.68%
BM&F	89,965	0	
Bourse de Montreal	336,544	961,650	35.00%
Chicago Board of Trade (CBOT)	762,007	263,629	289.05%
Chicago Board Options Exchange (CBOE)	136,679,303	110,822,096	123.33%
Chicago Mercantile Exchange (CME)	6,451,862	5,168,914	124.82%
International Securities Exchange (ISE)	40,886,923	23,979,352	170.51%
MexDer	35,989	0	
New York Board of Trade (NYBOT)	181,215	110,079	164.62%
Options Clearing Corp.	0	0	
Pacific SE	14,119,270	15,744,139	89.68%
Philadelphia SE	25,360,908	19,746,264	128.43%
Sao Paulo SE	1,589,765	1,600,461	99.33%
Europe, Africa, Middle East			
Athens Derivatives Exchange	941,387	1,388,985	67.78%
BME Spanish Exchanges	2,947,529	2,981,593	98.86%
Borsa Italiana	2,220,807	2,505,351	88.64%
Copenhagen SE	1,299	8,440	15.39%
Eurex	117,779,232	108,504,301	108.55%
Euronext	99,607,852	103,986,651	95.79%
JSE South Africa	11,268,763	10,505,417	107.27%
OMX Stockholm SE	8,947,439	6,371,381	140.43%
Oslo Bors	681,783	543,090	125.54%
Tel Aviv SE	36,915,103	29,353,595	125.76%
Warsaw SE	124,392	153,106	81.25%
Wiener Börse	40,855	27,680	147.60%
Asia Pacific			
Australian SE	794,121	630,900	125.87%
BSE, The SE Mumbai	56,046	43	130339.53%
Hong Kong Exchanges	2,133,708	2,150,923	99.20%
Korea Exchange	2,521,557,274	2,837,724,956	88.86%
National Stock Exchange India	2,812,109	1,332,417	211.05%
Osaka SE	16,561,365	14,958,334	110.72%
SFE Corp.	523,428	585,620	89.38%
Singapore Exchange	247,388	289,361	85.49%
TAIFEX	43,824,511	21,720,084	201.77%
Tokyo SE	17,643	98,137	17.98%
Total	3,137,482,893	3,357,354,658	93.45%

Exchange	2005	2004
	Volume Traded (Nber of Contracts)	
Americas		
American SE	8,678,564	7,290,157
BM&F	6,344	16,485
Bourse de Montreal	650,186	336,544
Chicago Board of Trade (CBOT)	728,349	762,007
Chicago Board Options Exchange (CBOE)	192,536,695	136,679,303
Chicago Mercantile Exchange (CME)	15,106,187	6,451,862
International Securities Exchange (ISE)	4,464,094	83,358
MexDer	37,346	35,989
New York Board of Trade (NYBOT)	217,334	181,215
Options Clearing Corp.	0	0
Philadelphia SE	6,234,567	5,275,701
Sao Paulo SE	2,257,756	1,589,765
Asia Pacific		
Australian SE	1,163,260	794,121
Bombay SE	100	NA
Hong Kong Exchanges	3,367,228	2,133,708
Korea Exchange	2,535,201,693	2,521,557,274
National Stock Exchange India	10,140,239	2,812,109
Osaka SE	24,894,925	16,561,365
SFE Corp.	680,303	523,428
Singapore Exchange	157,742	247,388
TAIFEX	81,533,102	43,824,511
Tokyo SE	20,004	17,643
Europe, Africa, Middle East		
Athens Derivatives Exchange	700,094	941,387
BME Spanish Exchanges	4,407,465	2,947,529
Borsa Italiana	2,597,830	2,220,807
Eurex	149,380,569	117,779,232
Euronext.liffe	70,228,310	99,607,852
JSE	11,473,116	11,303,311
OMX	12,229,145	8,947,439
Oslo Børs	515,538	695,672
Tel Aviv SE	63,133,416	36,915,103
Warsaw SE	250,060	78,752
Wiener Börse	37,127	40,855
Total	3,203,028,688	3,028,651,872

Europe.

In Germany.

Listed DAX options are done on a screen-based system.

Major players in this market are the large U.S and Continental investment banks.

In France.

Listed CAC 40 options trade on the French options market where trading is dominated by locals taking speculative positions and by large investment banks.

Institutional users are French insurance companies and fund managers. Players seek leveraged exposures on the market.

Guaranteed funds on the CAC 40 issued by French banks are popular among retail investors. CAC 40 options are used as part of these products. Major participants in the OTC market are large U.S and European investment banks.

Stock index markets in France:

- An interesting development in the CAC 40 futures is the distribution of open interest across various months.
- Institutions have led to move into the quarterly contracts to eliminate the chore of rolling on a monthly basis.

The lack of a developed stock-borrowing market can reduce trading in futures.

Professional traders can use the futures to hedge OTC options. To hedge collars traders can be short futures.

Arbitrageurs (short stock/long futures) can unwind easily their positions.

United Kingdom.

The market is dominated by major international banks and brokers. Short-term maturities have the most liquidity. End-users are mainly U.K institutions for hedging and guaranteed funds.

In OTC markets, the volume is also high because of greater liquidity in the longer-dated contracts. There is flexibility in expiration dates.

Switzerland.

Options are traded on the SOFFEX in an electronic screen system. Active participants are major Swiss and American Banks. End users are a mixture

of short-term speculators and international institutions looking for long exposures.

The OTC market is important because there is a need for longer-term strategies on the SMI from pension funds.

Zero premium collars are very popular.

Netherlands.

This market is dominated by locals who service a retail base.

Users are mainly pension funds who hedge equity portfolios.

The index must be compiled using a specific method.

The weighting of the index can overweight smaller, domestically oriented stocks and underweight larger, more internationally oriented stocks. For example, stocks can be weighted using a market capitalization and the maximum weight of a stock in the index will not exceed 10%. This puts a cap on some stocks.

The following table gives the notional value (value traded of stocks), the open interest (positions opened and still not unwind) and the option premiums for several countries.

The following tables provide different information for several markets and instruments. The reader can compare the different markets and instruments using these tables (source: World Federation of Exchanges).

DERIVATIVES - 3.1 STOCK OPTIONS										
Exchange	2006	2005	Notional Value		Open Interest		Number of Trades		Option Premium	
	Volume Traded (Nber of Contracts)		2006	2005	2006	2005	2006	2005	2006	2005
			(USD millions)						(USD millions)	
Americas										
Americas SE	198,994,609	193,086,271	45,779	42,238	NA	NA	4,709,107	7,652,680	NA	NA
Boston Options Exchange	92,260,125	77,592,231	NA	NA	NA	NA	NA	NA	NA	NA
Bourse de Montreal	12,265,461	10,032,227	68,947	54,904	1,583,405	1,346,141	732,202	554,076	2,212	1,645
Buenos Aires SE	49,235,173	92,386,787	NA	NA	1,654,931	1,605,194	NA	NA	456	547
Chicago Board Options Exchange (CBOE)	390,657,577	275,646,980	1,960,297	1,264,511	187,953,281	151,157,355	25,792,732	16,820,556	98,751	61,220
International Securities Exchange (ISE)	583,749,099	442,387,776	NA	NA	NA	NA	NA	NA	NA	NA
MexDer	448,120	135,591	829	208	0	2,630	62	49	NA	NA
Options Clearing Corp.	0	0	NA	NA	220,032,992	181,694,503	NA	NA	NA	NA
Pacific SE	196,586,356	144,780,498	NA	NA	NA	NA	NA	NA	NA	NA
Philadelphia SE	265,370,986	156,222,383	89,732	49,318	8,846,285	8,379,867	15,843,704	7,190,023	89,732	49,318
Sao Paulo SE	285,699,826	286,352,631	513,350	392,331	1,833,355	1,824,504	6,542,663	5,777,709	3,746	7,993
Asia Pacific										
Australian SE	20,491,463	21,547,732	303,886	270,423	1,766,513	1,678,335	1,474,017	1,418,149	11,501	9,057
Hong Kong Exchanges	18,127,353	8,772,393	88,371	41,784	2,533,807	1,021,913	399,129	241,785	2,477	1,334
Korea Exchange	1,195	3,855	41	11	50	NA	NA	103	NA	0
National Stock Exchange India	5,214,191	5,224,855	44,079	40,265	21,549	24,181	4,478,610	4,550,367	1,254	1,100
Osaka SE	753,837	1,016,987	NA	NA	22,541	79,610	4,064	5,454	199	293
TAIPEX	1,089,158	1,018,917	32	79	2,797	3,959	45,088	126,245	31	161
Tokyo SE	190,876	201,789	21	33	39,428	11,906	NA	NA	21	33
Europe, Africa, Middle East										
Athens Derivatives Exchange	17,194	21,729	52	60	1,297	2,004	396	397	31	2
BME Spanish Exchanges	12,425,979	10,915,227	27,775	20,605	2,748,562	2,411,628	75,313	65,136	1,067	633
Borsa Italiana	16,056,751	12,439,716	91,803	67,776	1,964,411	1,646,014	475,942	442,151	2,771	1,979
Budapest SE	650	176	5	6	NA	NA	6	8	NA	NA
Euronex	272,543,852	255,918,793	964,997	752,454	52,089,011	53,312,856	NA	NA	59,236	38,740
EuronextLife	155,552,010	294,714,128	603,265	618,732	45,341,415	55,353,971	3,272,556	2,728,190	32,141	70,685
ISE	5,751,832	2,539,526	312	163	916,339	564,302	2,836	1,733	NA	NA
OMX	64,514,641	57,138,563	69,691	57,580	8,418,826	7,404,692	NA	NA	27,306	15,434
Olx Bors	5,811,946	3,325,368	NA	NA	616,315	364,265	34,135	NA	643	321
RTS SE	10,727,870	7,281,162	11,453	2,797	1,431,028	433,158	150,940	113,317	NA	NA
Warsaw SE	10,869	4,372	98	29	62	413	5,501	2,642	4	1
Wiener Börse	1,053,298	816,032	5,385	4,609	116,063	76,166	NA	NA	230	165
Total	2,653,601,416	2,311,714,514								

NA - Not Available
- - Not Applicable

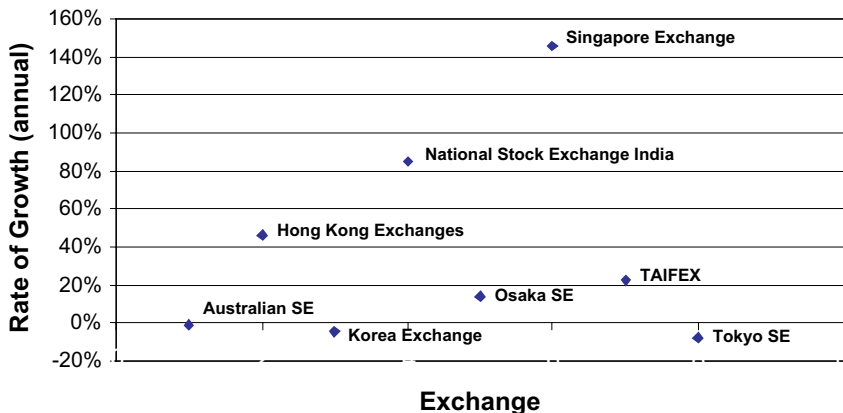
DERIVATIVES - 3.2 STOCK FUTURES

Exchange	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades	
Americas								
MexDer	3,000	19,400	211	85	0	3,400	621	17
Asia Pacific								
Australian SE	693,653	490,233	8,645	5,872	124,307	78,289	5,194	3,308
Bursa Malaysia Derivatives	958	-	4	-	0	-	NA	-
Hong Kong Exchanges	102,010	13,069	655	77	4,260	1,750	9,362	2,170
National Stock Exchange India	100,285,737	69,911,754	857,436	510,701	642,995	464,559	82,217,305	56,491,871
Europe, Africa, Middle East								
Athens Derivatives Exchange	2,476,487	1,431,514	5,543	3,160	116,576	124,815	285,982	167,715
BME Spanish Exchanges	21,229,811	18,813,689	43,266	31,708	1,649,184	1,921,717	139,441	119,499
Borsa Italiana	7,031,974	5,957,874	49,636	41,798	41,319	58,071	56,774	66,655
Budapest SE	918,426	740,394	9,052	7,842	65,015	24,336	92,618	81,468
Euronext	35,589,089	77,802	203,038	NA	1,459,509	58,107	NA	NA
Euronext.Liffe	29,515,726	12,158,093	344,198	64,062	1,489,169	487,117	22,948	21,006
JSE	69,671,751	24,469,988	26,288	10,223	12,027,716	1,535,839	392,154	177,766
OMX	8,459,165	5,659,823	6,128	NA	1,764,492	1,387,095	NA	NA
Oslo Bors	3,626,036	1,796,570	3,502	2,516	268,572	126,266	NA	NA
Warsaw SE	112,824	172,828	782	845	1,122	2,928	87,999	130,674
Wiener Borse	12,371	23,749	180	331	1,539	2,449	NA	NA
Total	279,730,018	140,736,581	-	-	-	-	-	-

DERIVATIVES - 3.3 STOCK INDEX OPTIONS

Exchange	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades	
Americas								
American SE	184	10,000,480	8,876,804	18,801	6,505	NA	120,598	109,214
Deri	928	228,204	167,000	4,401	3,315	108,607	38,350	748
Shohe de Montreal	589	57,874	27,807	3,477	1,627	1,891	4,413	4,620
Chicago Board of Trade (CBOT)	243	591,150	78,569	NA	NA	21,413	2,330	NA
Chicago Board Options Exchange (CBOE)	43	219,008,803	186,138,809	17,987,759	11,541,817	37,749,429	29,387,748	17,439,000
Chicago Mercantile Exchange (CME)	213	27,226,613	18,186,183	8,009,298	3,250,454	1,627,029	1,258,471	3,948,448
International Securities Exchange (ISE)	63	8,312,413	4,498,004	NA	NA	NA	NA	NA
Mercur	217	117,988	37,344	20,110	5,044	3,985	3,488	959
New York Board of Trade (NYBOT)	27	199,259	217,591	NA	NA	8,105	10,509	NA
Philadelphia SE	22	7,626,367	6,238,802	NA	NA	NA	NA	NA
San Paolo SE	192	1,816,784	2,257,258	4,800	2,271	146,377	146,000	537,007
Europe, Africa, Middle East								
Australian SE	25	1,500,884	1,844,000	198,089	94,268	137,643	189,230	80,037
Borsa Italiana	49	4,979,293	3,397,209	9,927	294,319	359,988	229,609	1,097,223
Korea Exchange	49	243,422,265	2,326,201,803	41,208,408	34,652,318	3,448,456	3,299,722	87,656,608
Norcom Stock Exchange India	63	18,125,248	10,146,208	148,113	16,027	154,610	46,123	6,448,608
Osaka SE	13	28,211,769	24,894,023	NA	NA	698,581	1,188,433	1,598,319
Singapore Exchange	16	89,873	139,742	26,111	30,308	8,498	27,652	NA
TAIFEX	23	95,931,804	81,931,102	2,452	20,367	67,180	79,819	18,844,128
Tokyo SE	4	18,364	20,004	2,352	2,102	2,178	3,005	NA
Asia Pacific								
Athens	4	670,583	700,004	8,674	7,314	11,340	10,303	74,996
BME Spanish	23	5,761,821	4,487,488	62,268	62,423	1,248,688	882,358	222,878
Borsa Italiana	39	2,319,914	2,597,803	331,862	259,473	133,854	120,000	149,422
Burx	49	217,232,249	140,389,589	9,586,257	5,272,408	23,529,972	24,898,598	NA
CME	25	11,600,000	11,000,000	8,896	7,098	1,249,728	1,512,038	13,696
OMX	11	13,813,270	12,220,149	188,365	147,281	885,814	979,371	NA
Oslo Bors	19	9,206,681	5,102,838	NA	NA	44,156	21,400	NA
San Paulo SE	19	75,536,100	63,130,416	1,427,043	964,407	438,340	347,240	12,917,880
Warsaw SE	27	318,840	260,000	3,005	1,304	4,347	6,442	117,288

2006 Option Trading Volume Growth: Asia



DERIVATIVES - 3.4 STOCK INDEX FUTURES									
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		
Americas									
BMF	16,940,891	6,683,525	293,433	207,990	178,243	301,590	1,464,734	803,605	
Bourse de Montréal	3,096,659	2,258,404	370,621	245,880	166,640	110,400	1,743,005	1,025,432	
Chicago Board of Trade (CBOT)	28,730,906	26,679,733	NA	1,501,704	167,040	97,208	NA	NA	
Chicago Mercantile Exchange (CME)	470,196,436	378,748,159	29,270,013	22,578,526	47,144,863	41,786,549	145,708,814	122,479,477	
MaxDer	620,557	410,561	132,292	61,413	30,859	22,130	33,739	24,244	
New York Board of Trade (NYBOT)	860,539	922,099	NA	NA	71,698	92,483	NA	NA	
Asia Pacific									
Australian SE	6,652,323	8,715,161	613,940	451,370	268,688	175,548	1,459,407	1,155,270	
Bursa Malaysia Derivatives	1,628,043	1,111,575	21,153	13,210	24,621	17,814	NA	NA	
Hong Kong Exchanges	19,747,245	13,393,462	2,014,834	987,256	185,262	136,465	9,443,472	6,338,936	
Korea Exchange	46,696,151	43,912,281	4,283,838	2,982,607	91,200	83,419	NA	13,557,429	
National Stock Exchange India	70,286,227	47,375,214	515,354	279,775	307,761	234,624	18,792,431	12,771,115	
Osaka SE	31,661,331	18,070,352	3,560,098	2,068,205	388,666	408,598	3,025,602	949,211	
Singapore Exchange	31,200,243	21,725,170	1,660,847	1,088,947	439,159	411,556	NA	NA	
TAIFEX	13,930,545	10,104,645	519,019	688,666	66,980	63,667	16,864,405	8,444,444	
Thailand Futures Exchange (TFEX)	186,737	-	2,595	-	7,601	-	111,214	NA	
Tokyo SE	14,907,723	12,788,102	2,074,924	1,510,707	389,690	385,914	NA	NA	
Europe, Africa, Middle East									
Athens Derivatives Exchange	2,634,245	2,521,790	37,971	27,724	16,159	18,727	454,205	380,035	
BME Spanish Exchanges	8,007,257	6,081,276	1,012,015	615,976	86,067	75,600	2,889,250	1,993,833	
Borsa Italiana	5,697,622	4,875,301	1,041,826	777,839	15,470	26,348	3,783,954	2,986,677	
Budapest SE	1,679,064	529,563	7,313	5,222	68,747	4,307	303,932	182,057	
Euronex	270,134,951	194,495,160	18,565,389	10,851,303	2,790,632	2,186,813	NA	NA	
Euronext/Liffe	72,135,006	56,092,515	6,318,763	4,154,454	1,166,209	1,027,559	18,101,967	13,122,326	
JSE	15,506,101	10,663,676	398,761	224,904	296,485	289,601	301,305	445,755	
OMX	24,374,765	20,259,025	329,352	NA	551,424	504,697	NA	NA	
Oslo Bors	2,437,118	962,911	19,616	8,245	56,943	13,665	22,816	NA	
Tel Aviv SE	32,474	13,460	589	219	2,682	2,315	219	71	
Warsaw SE	6,257,203	5,167,111	59,920	34,864	72,706	30,348	2,121,215	1,437,611	
Wiener Börse	154,521	104,677	13,533	6,981	17,046	13,260	NA	NA	
Total	1,166,696,884	881,260,593	-	-	-	-	-	-	-

DERIVATIVES - 3.5 SHORT TERM INTEREST RATE OPTIONS									
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		Option Premium (USD millions)
Americas									
BMF	10,554,948	3,082,800	11,195	20,840	2,354,423	697,304	12,853	9,855	NA
Bourse de Montréal	605,806	377,370	536,720	311,501	78,861	44,373	2,084	1,476	92
Chicago Board of Trade (CBOT)	9,424,628	6,534,587	NA	32,672,935	1,130,942	927,916	NA	NA	NA
Chicago Board Options Exchange (CBOE)	2,594	4,381	13	14	343	317	288	577	1
Chicago Mercantile Exchange (CME)	268,937,139	188,031,096	268,937,127	188,001,090	16,808,764	16,325,364	1,140,862	951,078	NA
Asia Pacific									
Australian SE	206,853	247,790	156,487	188,719	59,544	54,132	382	425	NA
Singapore Exchange	6,700	-	7,691	0	8,700	0	NA	0	NA
Tokyo Financial Exchange	3,976,697	41,294	3,418,070	37,171	481,355	32,500	NA	NA	NA
Europe, Africa, Middle East									
Euronext/Liffe	92,885,715	79,482,008	104,878,071	89,052,367	10,367,369	9,586,715	65,326	76,311	NA
OMX	65,000	-	NA	-	67,000	-	NA	-	-
Total	386,818,680	277,741,236	-	-	-	-	-	-	-

NA - Not Available
-- Not Applicable

DERIVATIVES - 3.6 SHORT TERM INTEREST RATE FUTURES									
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		
Americas									
BMF	180,822,732	143,895,871	7,353,654	5,338,229	9,784,628	7,332,556	595,048	486,397	
Bourse de Montréal	16,702,302	11,157,288	14,770,015	9,209,807	393,078	331,916	825,430	724,190	
Chicago Board of Trade (CBOT)	17,833,331	11,802,282	NA	58,011,410	14,975	455,444	NA	NA	
Chicago Mercantile Exchange (CME)	503,729,899	411,706,656	805,339,873	413,781,671	8,554,114	8,596,023	60,357,744	52,168,804	
MaxDer	267,450,231	104,339,918	28,564,227	10,346,810	44,058,415	21,205,607	65,227	48,623	
Asia Pacific									
Australian SE	22,860,491	18,199,674	19,823,462	15,665,366	902,367	760,267	250,184	236,344	
Bursa Malaysia Derivatives	272,302	162,362	74,545	0	42,863	59,801	37,968	NA	
Hong Kong Exchanges	14,043	25,181	2,171	3,877	1,532	1,477	752	1,228	
Korea Exchange	615	3,308	187	622	NA	NA	NA	163	
Singapore Exchange	3,573,665	2,890,729	2,915,805	2,466,068	288,215	415,431	NA	NA	
TAIFEX	46	217	138	310	0	0	72	217	
Tokyo Financial Exchange	31,495,084	10,977,981	27,070,811	9,903,104	2,336,719	1,418,937	NA	NA	
Europe, Africa, Middle East									
Budapest SE	2,500	1,390	12	3	0	500	5	16	
Euronex	767,458	688,831	937,964	833,748	48,207	37,838	NA	NA	
Euronext/Liffe	296,098,444	248,662,863	341,274,218	280,316,062	6,092,072	5,242,458	32,413,840	25,668,450	
JSE	667	0	NA	NA	63	0	NA	NA	
OMX	6,170,853	6,315,805	NA	NA	526,914	345,833	NA	NA	
Total	1,348,704,857	976,396,236	-	-	-	-	-	-	-

DERIVATIVES - 3.7 LONG TERM INTEREST RATE OPTIONS

Exchange	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades		Option Premium (USD millions)	
Americas										
Bourse de Montréal	2,275	7	202	0	0	2	25	NA	0	NA
Buenos Aires SE	8,437	86,038	NA	NA	0	293	NA	NA	1	5
Chicago Board of Trade (CBO)	95,737,965	89,888,554	NA	8,931,118	3,097,170	2,517,938	NA	NA	NA	NA
Chicago Board Options Exchange (CBOE)	18,736	61,245	92	265	2,038	7,465	1,318	5,203	5	13
Asia Pacific										
Australian SE	3,086,456	2,307,659	235,067	175,753	14,733	1,729	11,078	10,494	NA	NA
Singapore Exchange	0	725	0	308	NA	NA	NA	NA	NA	NA
Tokyo SE	2,060,524	1,899,037	NA	2,120,803	18,987	22,939	NA	NA	4,306	3,222
Europe, Africa, Middle East										
Eurex	76,328,806	58,551,836	10,870,919	8,449,133	1,786,810	1,405,448	NA	NA	NA	NA
JSE	2,785	4,831	NA	11	NA	NA	NA	79	NA	NA
Total	177,246,085	152,989,930	-	-	-	-	-	-	-	-

DERIVATIVES - 3.8 LONG TERM INTEREST RATE FUTURES

Exchange	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades	
Americas								
BM&F	67,301	16,172	4,214	1,484	1,731	181	1,102	307
Bourse de Montréal	7,777,098	4,824,924	695,280	398,274	337,120	166,504	1,005,657	772,125
Chicago Board of Trade (CBO)	512,163,874	446,068,592	NA	46,723,075	5,035,467	3,614,314	NA	NA
MeaDer	500,479	284,460	52,437	27,750	43,450	2,101	2,584	1,402
Philadelphia SE	10	-	NA	-	0	-	10	-
Asia Pacific								
Australian SE	45,121,853	36,255,583	3,413,538	2,761,260	872,581	593,812	671,133	655,235
Bursa Malaysia Derivatives	28,181	27,068	771	715	0	150	NA	NA
Hong Kong Exchanges	0	1,250	0	169	NA	NA	0	50
Korea Exchange	10,348,884	11,223,811	1,180,451	1,208,118	112,852	81,407	NA	1,838,183
Singapore Exchange	1,427,462	1,241,852	116,352	105,758	40,186	27,645	NA	NA
TAIFEX	40,675	2,887	6,745	1,045	258	22	51,878	2,348
Tokyo Financial Exchange	13,680	78,943	1,176	7,122	300	1,450	NA	NA
Tokyo SE	12,149,979	9,844,617	10,357,258	8,881,028	131,772	116,664	NA	NA
Europe, Africa, Middle East								
BME Spanish Exchanges	15	46	2	6	1	2	8	22
Budapest SE	2,500	-	12	-	0	-	5	-
Eurex	654,119,660	599,621,461	92,905,934	85,843,727	3,796,014	3,357,373	NA	NA
EuronextLiffe	23,245,504	19,078,373	4,356,744	3,468,410	360,521	292,141	2,059,645	2,002,722
JSE	8,947	10,362	NA	NA	63	0	NA	NA
OMX	4,354,311	3,097,742	NA	NA	184,780	140,258	NA	NA
Tel Aviv SE	25,005	-	662	-	681	-	1,985	-
Warsaw SE	12,875	39,362	431	1,028	50	58	164	484
Total	1,271,406,293	1,131,707,505	-	-	-	-	-	-

NA : Not Available
 - : Not Applicable

DERIVATIVES - 3.9 CURRENCY OPTIONS

Exchange	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades	Option Premium (USD millions)
Americas								
Bourse de Montréal	31,262	7,264	277	70	2,838	2,891	2,010	468
BM&F	10,525,832	6,850,041	44,173	36,604	927,188	799,578	30,110	28,340
Chicago Mercantile Exchange (CME)	3,289,498	3,182,323	451,886	440,583	230,420	228,288	682,415	609,974
MeaDer	305	0	34	0	2	0	9	0
New York Board of Trade (NYBOT)	44,322	35,970	NA	NA	3,690	1,778	NA	NA
Options Clearing Corp.	0	0	NA	NA	10,602	17,330	NA	NA
Philadelphia SE	131,508	159,748	149	166	10,476	17,213	6,370	8,861
Europe, Africa, Middle East								
Budapest SE	1,022,457	258,000	1,303	251	25,500	86,700	1,050	209
EuronextLiffe	733,039	403,957	9,056	4,728	52,150	42,240	17,712	23,871
Tel Aviv SE	7,447,717	6,937,575	74,820	69,802	224,904	217,476	335,782	270,799
Total	23,225,941	17,835,080	-	-	-	-	-	-

NA : Not Available
 - : Not Applicable

DERIVATIVES - 3.10 CURRENCY FUTURES										
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades			
Americas										
BMF&F	1,726,351	1,293,181	2,736,810	1,737,251	877,724	475,755	1,726,351	1,289,181		
Buenos Aires SE	800	2,416	1	2	NA	NA	NA	NA	NA	NA
Chicago Mercantile Exchange (CME)	110,338,043	81,105,391	13,399,645	9,798,905	1,098,880	711,360	65,453,858	53,154,207		
ROFEX	17,836,247	12,932,275	NA	NA	196,293	323,189	NA	NA	NA	NA
MaxDer	6,077,409	2,934,793	670,393	323,969	248,205	128,992	4,115	2,765		
New York Board of Trade (NYBOT)	3,653,024	3,604,877	NA	NA	149,595	127,497	NA	NA	NA	NA
Asia Pacific										
Australian SE	1,363	4,402	103	337	0	37	370	988		
Korea Exchange	3,158,049	2,667,005	158,463	133,678	160,722	85,520	NA	633,514		
Tokyo Financial Exchange	0	600	0	5	NA	NA	NA	NA	NA	NA
Europe, Africa, Middle East										
Athens Derivatives Exchange	84	21,844	7	1,892	0	80	3	3,851		
Budapest SE	10,857,327	7,742,408	14,535	10,698	301,032	406,942	30,281	19,790		
EuronextLiffe	8,807	7,435	216	176	1,043	518	1,221	1,510		
Turkish Derivatives Exchange	4,588,416	1,603,797	NA	1,663	170,431	134,063	NA	NA		
Warsaw SE	3,144	6,218	34	65	88	88	2,579	5,184		
Total	198,359,064	113,926,650	-	-	-	-	-	-	-	-

NA : Not Available
- : Not Applicable

DERIVATIVES - 3.11 COMMODITY OPTIONS										
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of contracts)		Notional Value (USD millions)		Open Interest (Nber of contracts)		Number of Trades		Option Premium (USD millions)	
Americas										
BMF&F	177,719	195,103	194	194	12,541	5,999	1,354	1,560	NA	NA
Chicago Board of Trade (CBOT)	21,861,340	16,353,965	NA	304,650	2,177,795	900,266	NA	NA	NA	NA
Chicago Mercantile Exchange (CME)	2,010,226	943,377	67,569	34,008	307,489	116,431	470,808	388,526	NA	NA
Mercado a Término de Buenos Aires	2,815,000	2,091,500	NA	NA	NA	NA	NA	NA	NA	NA
New York Board of Trade (NYBOT)	11,662,056	8,663,470	NA	220,560	1,146,100	928,436	NA	NA	NA	NA
NYMEX	54,468,396	38,002,895	NA	2,193,391	9,297,986	NA	NA	NA	NA	NA
ROFEX	34,815	59,475	NA	NA	6,039	4,705	NA	NA	NA	NA
Asia Pacific										
Australian SE	10,683	558	380	72	21,264	389	488	49	NA	NA
Tokyo Grain Exchange	27,262	27,101	NA	42	409	289	284	40	NA	NA
Europe, Africa, Middle East										
Budapest SE	832	40	13,42	0	260	98	29	3	NA	NA
EuronextLiffe	727,190	444,754	271	226	136,475	60,129	9,267	7,056	21	11
ICE Futures	138,129	118,476	NA	NA	23,967	5,832	NA	NA	NA	NA
JSE	512,518	451,885	1,898,026	337,671	46,568	57,560	52,749	40,655	NA	NA
London Metal Exchange	8,412,350	8,184,187	NA	468,446	1,007,248	757,837	NA	NA	6,716	4,397
Total	102,858,516	75,538,786	-	-	-	-	-	-	-	-

NA : Not Available
- : Not Applicable

DERIVATIVES - 3.12 COMMODITY FUTURES										
Exchange	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005
	Volume Traded (Nber of Contracts)		Notional Value (USD millions)		Open Interest (Nber of Contracts)		Number of Trades			
Americas										
BMF&F	1,318,203	1,073,471	12,436	10,108	63,964	50,998	219,847	214,280		
Chicago Board of Trade (CBOT)	118,719,938	78,788,964	NA	1,280,074	2,821,951	1,732,853	NA	NA	NA	NA
Chicago Mercantile Exchange (CME)	17,448,155	11,598,317	613,145	394,707	536,649	387,575	5,079,223	4,212,551		
Mercado a Término de Buenos Aires	11,899,472	11,562,286	NA	NA	NA	NA	NA	NA	NA	NA
New York Board of Trade (NYBOT)	28,233,129	24,486,440	NA	500,155	1,065,666	901,038	NA	NA	NA	NA
NYMEX	178,929,185	166,608,842	NA	8,893,687	9,326,151	NA	NA	NA	NA	NA
ROFEX	116,937	118,973	NA	NA	11,984	10,408	NA	NA	NA	NA
Asia Pacific										
Australian SE	185,349	36,481	3,321	1,160	55,600	18,010	12,295	6,150		
Bursa Malaysia Derivatives	2,230,340	1,158,510	48,051	21,313	74,587	28,918	NA	NA		
Central Japan Commodity Exchange	9,019,416	33,179,422	NA	1,843,220	117,816	182,304	NA	NA	NA	NA
Dalian Commodity Exchange	117,681,038	89,174,714	NA	822,949	1,154,982	482,978	NA	NA	NA	NA
Korea Exchange	3,158,049	2,667,005	158,463	133,678	160,722	85,520	NA	NA	NA	NA
Shanghai Futures Exchange	58,106,001	33,789,754	NA	515,274	198,219	154,723	NA	NA	NA	NA
TAIFEX	35,027	0	2,206	0	44	0	12,734	0		
Tokyo Grain Exchange	19,108,247	25,573,238	1,302,452	406,973	438,435	583,665	NA	NA	NA	NA
Zhengzhou Commodity Exchange	46,298,117	28,472,570	NA	16,168	213,847	452,098	NA	NA	NA	NA
Europe, Africa, Middle East										
Budapest SE	8,750	778	140	9	1,093	601	1,856	1,889		
EuronextLiffe	9,124,195	8,054,118	119,436	85,794	449,829	419,333	1,257,639	906,230		
ICE Futures	92,552,821	41,938,809	NA	NA	1,389,616	642,753	NA	NA	NA	NA
JSE	1,436,155	1,335,964	1,864,750	15,158,450	43,295	51,296	206,430	199,787		
London Metal Exchange	78,527,839	70,444,685	7,148,569	4,045,775	1,515,663	2,411,870	NA	NA	NA	NA
Total	794,164,463	627,958,969	-	-	-	-	-	-	-	-

NA : Not Available
- : Not Applicable

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