



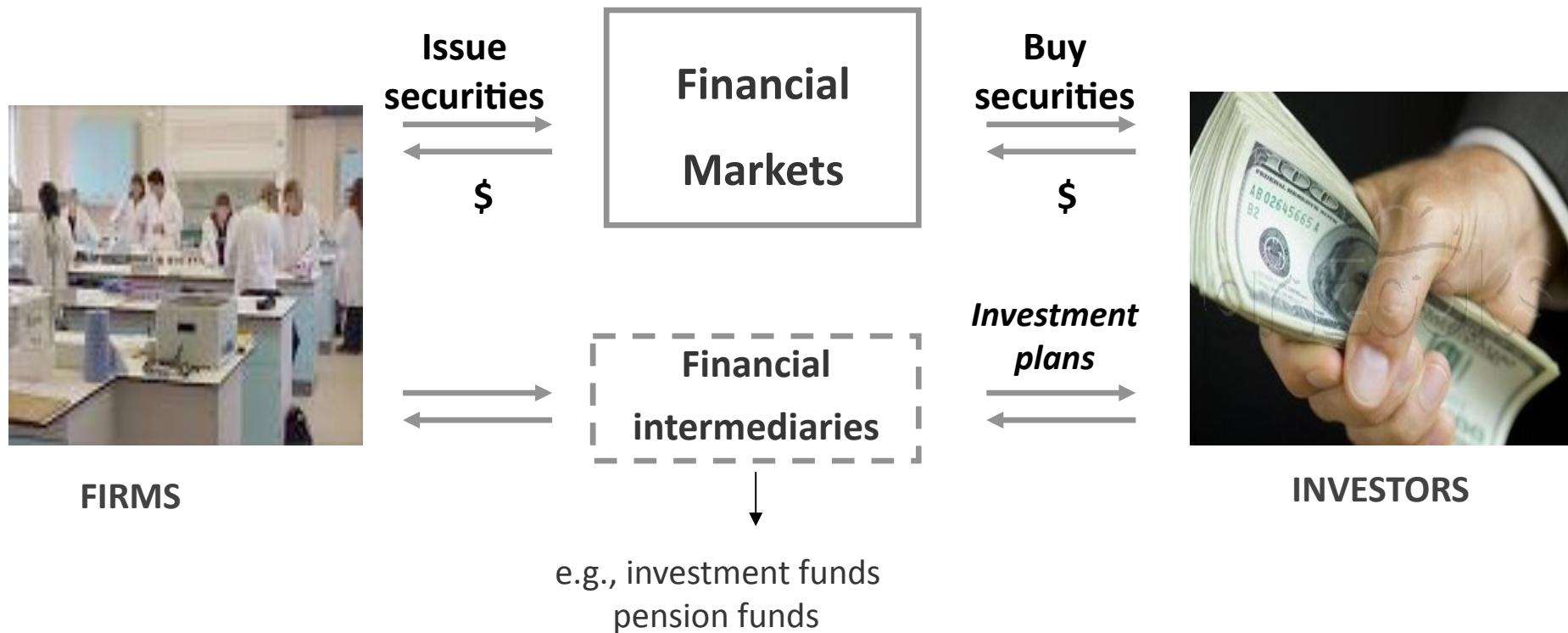
## Part I

# An Introduction to Financial Markets



## Financial Markets and Investments

Mercados e Investimentos Financeiros





# Financial Markets



## INVESTORS

For **investors** financial market allow them to invest their savings, as an alternative to bank deposits. Investment can be made in several securities, that offer different types of risk and return

## FIRMS

For **firms** financial markets are a source of financing, which are an alternative to bank loans.

## OTHER PLAYERS

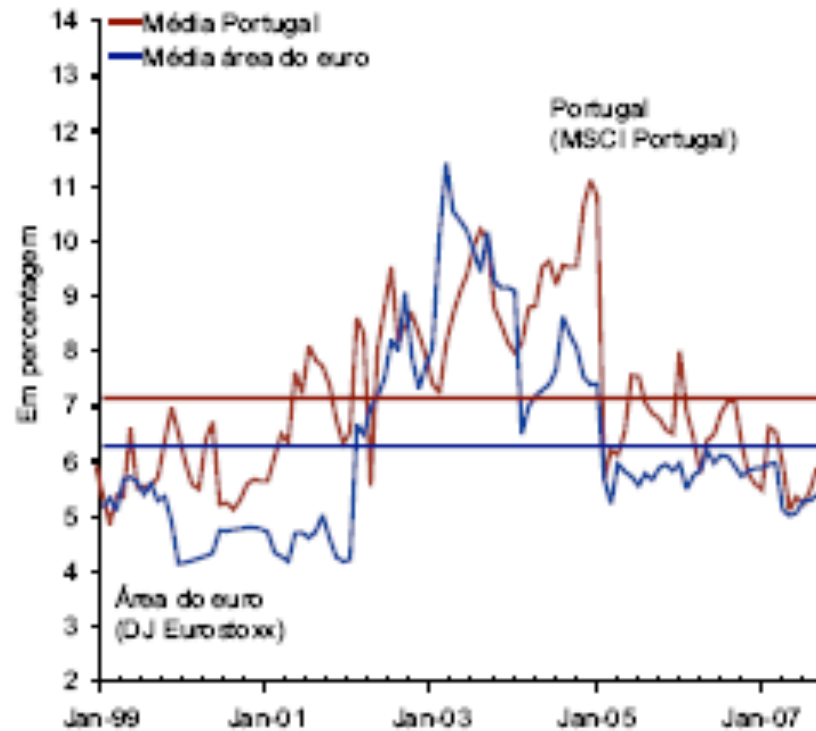
*Investment bankers; portfolio managers; retail investors; brokers; dealers.*

## FUNDING STRUCTURE OF FIRMS (STOCKS) As a percentage of the total

	Empréstimos				Títulos de dívida			Acções e outras participações		
	Total	Até 1 ano	Entre 1 e 5 anos	Superior a 5 anos	Total	Curto prazo	Longo prazo	Total	Cotadas	Não cotadas
Dezembro de 1998										
Portugal	23	14	5	4	6	1	5	71	28	43
Área do euro	25	9	3	12	4	1	3	72	31	41
Dezembro de 2006										
Portugal	31	13	8	10	9	5	4	60	20	40
Área do euro	23	7	4	12	4	2	3	73	27	46

Fontes: BCE e Banco de Portugal.

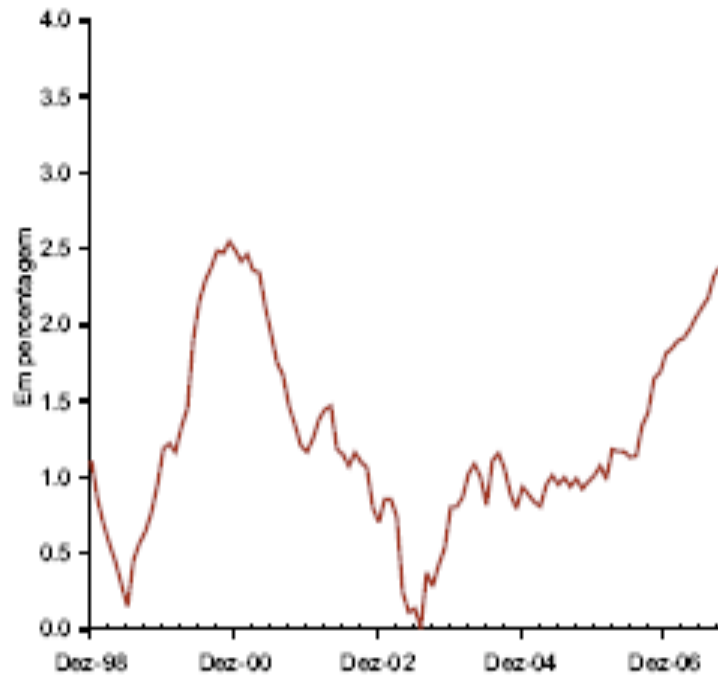
## Real cost of capital



Fontes: Thomson Financial Datastream, ConsensusEconomics e cálculos do Banco de Portugal.

## REAL COST OF FINANCING THROUGH COMMERCIAL PAPER

## Real COST OF FINANCING THROUGH BONDS



Fontes: Consensus Economics e Banco de Portugal.





# Financial Markets



## Financing per Instrument in International Capital Markets (\$bn)

	1996	1998	2000	2002	2004
<b>Bonds and Money Market Securities</b>	543	678	1241	1009	1621
<b>Stocks</b>	83	125	317	102	214
<b>Syndicated Loan</b>	901	902	1485	1300	1807
<b>Total</b>	<b>1527</b>	<b>1705</b>	<b>3043</b>	<b>2411</b>	<b>3642</b>

Fonte: *Bank for International Settlements*



# Financial Markets



## Highest market capitalization

2006, March 31 <sup>st</sup>	Market Capitalisation, \$bn
Exxon Mobil (US)	371.6
General Electric (US)	362.5
Microsoft (US)	281.2
Citigroup (US)	238.9
BP (UK)	233.3
Bank of America (US)	211.7
Royal Dutch Shell (NL/UK)	211.3
Wal-Mart (US)	196.9
Toyota Motor (Japan)	196.7
Gazprom (Russia)	196.3
HSBC (UK)	190.3
Procter & Gamble (US)	189.6

**Note:** Net Domestic Income of Portugal 2006: 154 billions of euros

**Source:** Financial Times

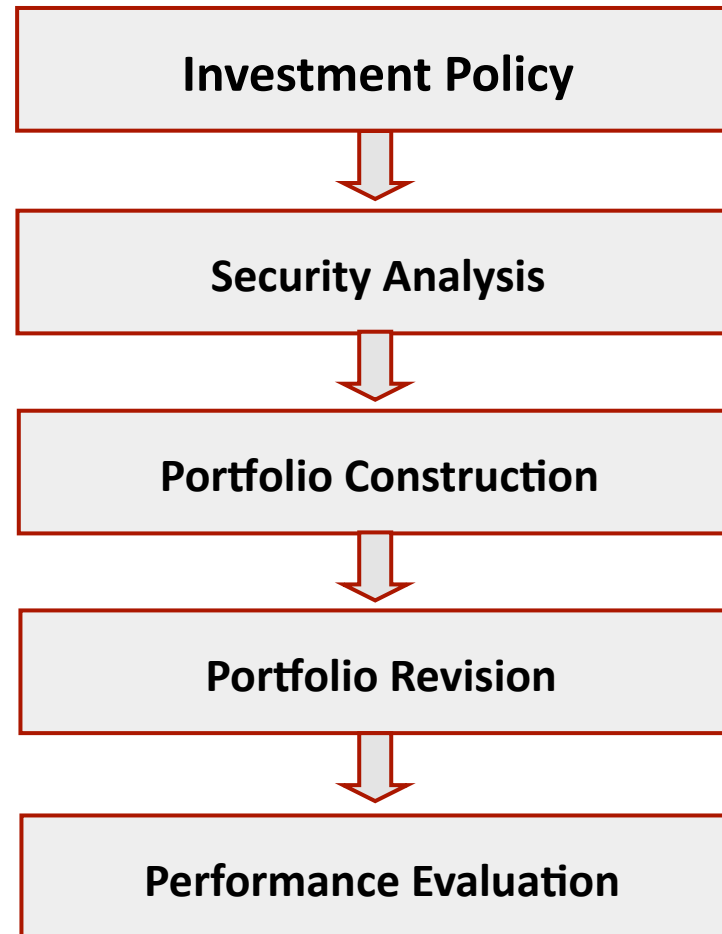




# Financial Markets



## The Investment Process





# Financial Markets



## 1. Set Investment Policy

- Indicate the investment objectives;
- Indicate the policy asset mix;
- Select the portfolio management style (active vs. passive management)

## 2. Perform Security Analysis

- Selection of securities for investment;
- Fundamental vs. Technical Analysis.

## 3. Portfolio Construction

- How much to invest in each security;
- Diversification;
- Timing.



# Financial Markets



## 4. Portfolio Revision

- Repetition of the three previous steps, as objectives might change and previously held portfolio might not be the optimal one;
- Cost-benefit Analysis.

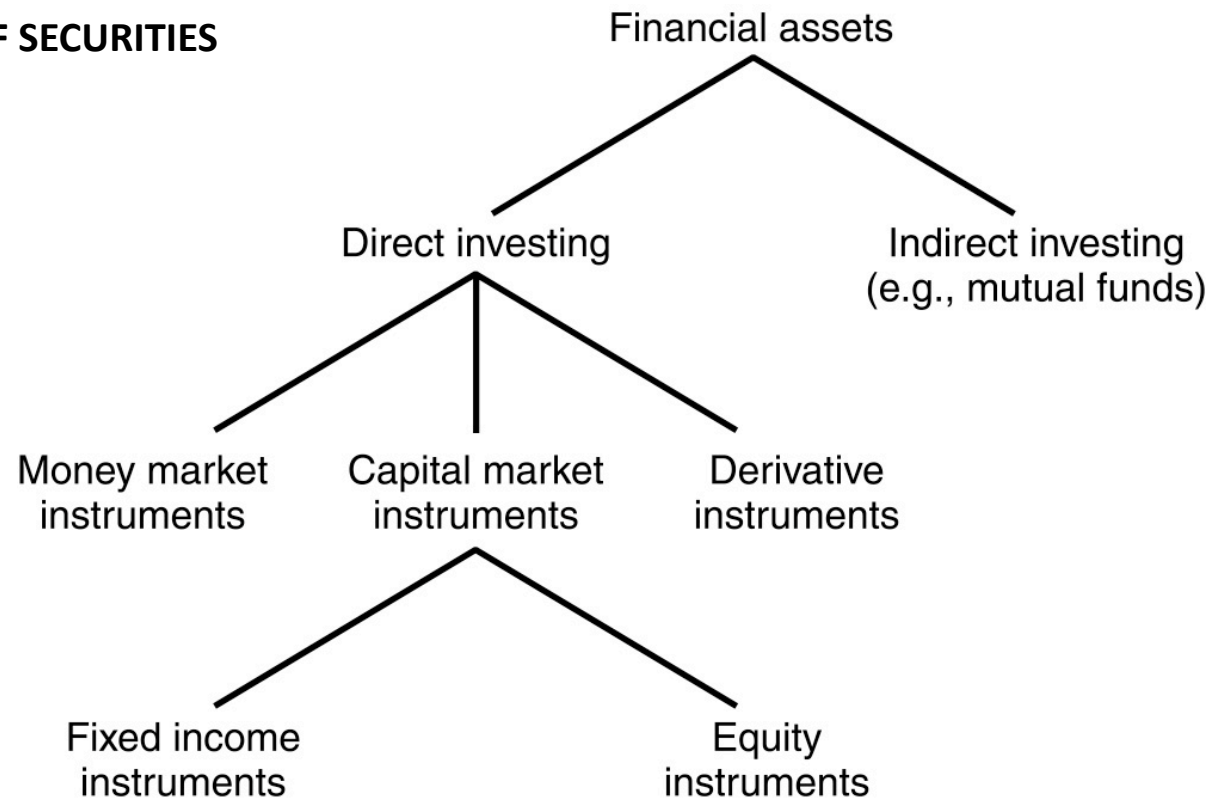
## 5. Portfolio Performance Evaluation

- How was the portfolio performed over some time period?
- Return earned vs. return incurred;
- Benchmarking.

## SECURITIES

Securities are contracts, differing on return and risk.

## TYPES OF SECURITIES





# Financial Markets



## Money Market Instruments

Money market instruments are short-term debt instruments sold by government, financial institutions, and corporations. The important characteristic of these securities is that they have maturities when issued of one year or less.

### ○ Treasury Bills

- Involve lending money on a short-term basis to the US Treasury;
- Maturity at issuance of no more than one year (91, 182 and 264 days);
- T-bills carry little (if any) risk.

### ○ Repurchase Agreement (Repos or RPs)

### ○ LIBOR

### ○ Negotiable Certificate of Deposit

### ○ Bankers Acceptances

### ○ Commercial Paper

### ○ Eurodollars

## Listing of Treasury Issues

### U.S. Government Bonds and Notes

RATE	MATURITY MO/YR	BID	ASKED	CHG	ASK YLD	RATE	MATURITY MO/YR	BID	ASKED	CHG	ASK YLD
3.375	Jan 07i	99:28	99:29	----	6.72	4.250	Nov 13n	97:29	97:30	+10	4.60
3.125	Jan 07n	99:27	99:28	----	4.62	2.000	Jan 14i	97:16	97:17	+1	2.38
2.250	Feb 07n	99:21	99:22	----	4.89	4.000	Feb 14n	96:09	96:10	+10	4.61
6.250	Feb 07n	100:04	100:05	----	4.73	4.750	May 14n	100:26	100:27	+9	4.61
3.375	Feb 07n	99:23	99:24	----	4.90	13.250	May 14	119:02	119:03	+4	4.61
3.750	Mar 07n	99:21	99:22	----	4.99	2.000	Jul 14i	97:14	97:15	----	2.37
3.875	Feb 13n	96:06	96:07	+8	4.59	4.250	Aug 14n	97:21	97:22	+10	4.61
3.625	May 13n	94:23	94:24	+8	4.58	12.500	Aug 14	119:04	119:05	+4	4.62
1.875	Jul 13i	97:00	97:01	+1	2.37	11.750	Nov 14	118:30	118:31	+6	4.59
4.250	Aug 13n	98:00	98:01	+9	4.60	4.250	Nov 14n	97:19	97:20	+9	4.61
12.000	Aug 13	111:04	111:05	+2	4.71	1.625	Jan 15i	94:18	94:19	+1	2.37

**FIGURE 2.4** Listing of Treasury issues

Source: Compiled from data obtained from the online edition of *The Wall Street Journal*, January 5, 2007.



# Financial Markets



## Capital Market Instruments

Capital market instruments are long-term debt instruments sold by government, financial institutions, and corporations. The important characteristic of these securities is that they have maturities when issued of more than one year.

### **FIXED INCOME**

#### **o Treasury Notes and Bonds**

- Involve lending money on a long-term basis to the US Treasury;
- Maturity at issuance of more than one year. Treasury notes: 1 to 10 years; Treasury Bonds: 10 to 30 years;
- Long-term T-Bonds carry a considerable amount of risk.

#### **o Federal Agency Securities and Municipal Securities**

#### **o Municipal Securities**

#### **o Long-Term Corporate Bonds**

- Involve lending money on a long-term basis to corporations;
- Long-Term corporate bonds carry more risk than T-bonds.



# Financial Markets



## Capital Market Instruments

### **NOT SO FIXED INCOME**

- **Preferred Stock**
- **Mortgage-Backed Securities**
- **Common Stocks (Equity)**
  - Commitment on the part of a corporation to pay periodically dividends;
  - Common stocks provide substantial returns but are riskier than long-term bonds.





# Financial Markets



## Listing of Stocks Traded on the NYSE

NAME	SYMBOL	CLOSE	NET CHG	VOLUME	52 WK HIGH	52 WK LOW	DIV	YIELD	P/E	YTD% CHG
Gencorp	GY	13.59	-0.29	491,300	20.75	12.02	....	....	dd	-3.1
Genentech	DNA	83.68	-0.35	3,986,300	94.46	75.58	....	....	49	3.1
General Cable	BGC	42.67	-1.11	679,700	45.41	20.3	....	....	23	-2.4
General Dynamics	GD	74.59	0.17	1,497,300	77.98	56.68	0.92	1.2	16	0.3
General Electric	GE	37.56	-0.19	26,907,700	38.49	32.06	1.12	3	23	0.9
General Gwth Prop	GGP	51.51	-0.8	1,308,200	56.14	41.92	1.8	3.5	215	-1.4
General Maritime	GMR	34.56	-0.83	597,400	40.64	30.34	4.8	13.9	5	-1.8
General Mills	GIS	56.97	-0.42	1,355,600	59.23	47.05	1.48	2.6	18	-1.1
General Motors	GM	30.24	0.6	10,477,600	36.56	19	1	3.3	dd	-1.6
Genesco Inc	GCO	36.75	-0.9	127,900	43.72	25.5	....	....	15	-1.5
Genesee & Wyoming	GWR	25.86	-0.5	364,500	36.75	21	....	....	9	-1.4
Genesis Lease	GLS	23.6	0.1	298,500	24.4	23	....	....	....	0.4
Genuine Parts co.	GPC	46.86	-0.51	384,400	48.34	40	1.35	2.9	17	-1.2
Genworth Financial	GNW	33.79	-0.32	1,414,900	36.47	31	0.36	1.1	13	-1.2
Geo Group Inc	GEO	37.57	-1.53	157,500	40.3	14.69	....	....	35	0.1
Georgia Gulf	GGC	18.69	-0.38	479,000	34.65	18.36	0.32	1.7	6	-3.2
Gerber Scientific	GRB	12.32	-0.07	243,200	16.8	9	....	....	27	-1.9
Gerdau Ameristeel	GNA	8.59	-0.04	446,200	11.02	5.85	0.08	0.9	7	-3.7
Gerdau S.A. Ads	GGB	15.57	-0.56	1,729,100	18.16	11.27	0.58	3.7	....	-2.7

**FIGURE 2.8** Listing of stocks traded on the New York Stock Exchange

Source: Compiled from data from *The Wall Street Journal Online*, January 9, 2007.



# Financial Markets



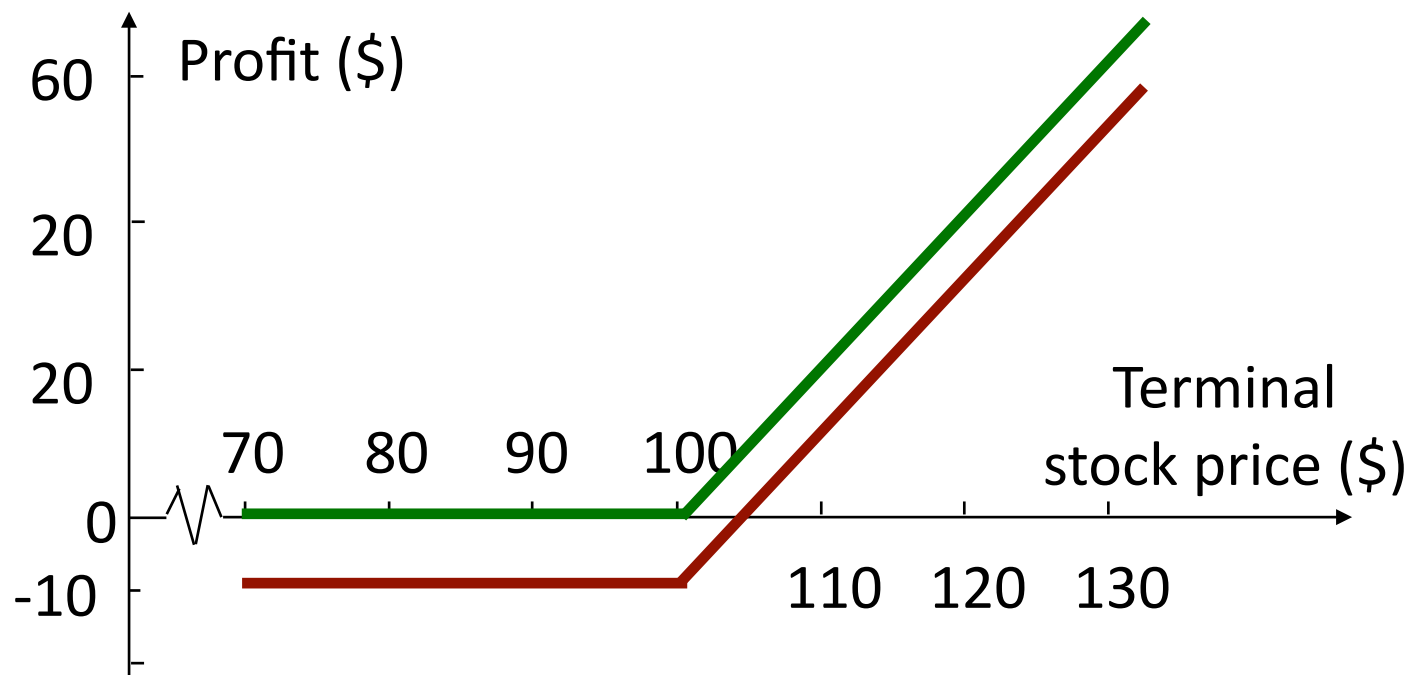
## Derivatives Instruments

- A derivative is a security whose value depends upon the value of other securities;
- Options (e.g. a call option on IBM);
- Futures (e.g. futures contract on oil);
- Forwards (e.g. a forward contract on British Pound)
- Positions in derivatives can be very risky.

## Derivatives Instruments: an example

### Long Call on EDP

**Payoff** and **profit** from buying one EDP European call option:  
option price = \$10, strike price = \$100, option life = 1 year





# Financial Markets



## Derivatives Instruments

### Options

#### Basic Positions

Call (Buy)

Put (Sell)

#### Terms

Exercise Price

Expiration Date

Assets

### Futures

- Basic Positions

- Long (Buy)

- Short (Sell)

- Terms

- Delivery Date

- Assets

## Trading Data on GE Options

Gen EI (GE)		Underlying stock price: 41.10					
Expiration	Strike	Call			Put		
		Last	Volume	Open Interest	Last	Volume	Open Interest
Oct 2007	37.50	3.90	110	10411	0.12	394	20014
Nov 2007	37.50	4.23	112	2	0.27	236	140
Dec 2007	37.50	4.45	257	27876	0.49	507	33731
Mar 2008	37.50	...	...	5721	1.07	272	11931
Oct 2007	40.00	1.68	4823	46175	0.45	1659	17500
Nov 2007	40.00	2.14	897	135	0.70	170	163
Dec 2007	40.00	2.49	700	136176	1.06	356	36470
Mar 2008	40.00	3.35	113	13141	1.78	49	18901
Oct 2007	42.50	0.38	4525	66631	1.64	2838	5784
Nov 2007	42.50	0.72	1439	1996	1.83	67	269
Dec 2007	42.50	1.07	540	31560	2.13	805	10872
Mar 2008	42.50	1.90	74	9767	2.98	50	4054

**FIGURE 2.10** Trading data on General Electric options

Source: Compiled from data downloaded from *The Wall Street Journal Online*, September 25, 2007.



# Financial Markets



## Listing of Selected Futures Contracts

Agriculture Futures							Currency Futures						
	OPEN	HIGH	LOW	SETTLE	CHG	OPEN INT							
<b>Corn (CBT)</b> -5,000 bu.; cents per bu.							<b>Japanese Yen (CME)</b> -¥12,500,000; \$ per 100¥						
March	371.00	372.50	360.50	<b>362.25</b>	-8.25	591,430	March	.8456	.8485	.8447	<b>.8479</b>	.0016	275,282
Dec	361.75	366.00	357.00	<b>359.00</b>	-3.00	311,690	June	.8561	.8579	.8545	<b>.8577</b>	.0016	5,119
<b>Oats (CBT)</b> -5,000 bu.; cents per bu.							<b>British Pound (CME)</b> -£62,500; \$ per £						
March	261.75	265.75	258.25	<b>261.25</b>	-.75	8,823	March	1.9516	1.9537	1.9403	<b>1.9448</b>	-.0063	136,995
Dec	233.00	234.25	232.50	<b>233.75</b>	.75	3,907	June	1.9446	1.9531	1.9402	<b>1.9443</b>	-.0063	191
<b>Soybeans (CBT)</b> -5,000 bu.; cents per bu.							<b>Index Futures</b>						
Jan	667.00	675.00	659.75	<b>662.75</b>	-6.50	9,947	<b>DJ Industrial Average (CBT)</b> -\$10 x index						
March	681.00	687.75	672.50	<b>675.50</b>	-6.50	220,362	March	12543	12575	12470	<b>12549</b>	19	64,555
							<b>S&amp;P 500 Index (CME)</b> -\$250 x index						
							June	12629	12647	12601	<b>12647</b>	18	44
							March	1425.20	1431.50	1417.00	<b>1427.50</b>	2.70	601,655
							June	1432.00	1444.50	1430.50	<b>1440.10</b>	2.60	13,287

**FIGURE 2.11** Listing of selected futures contracts

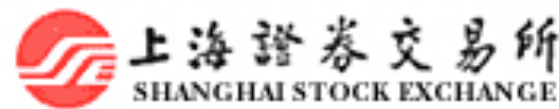
Source: *The Wall Street Journal*, January 5, 2007. Reprinted by permission of Dow Jones & Company, Inc. via Copyright Clearance Center, Inc. © 2007 Dow Jones & Company, Inc. All Rights Reserved Worldwide.



# Financial Markets



## Main Markets





# Financial Markets



## Main Markets of Derivatives



+







# Financial Markets



## Main Markets (Oct. 2007)

Stock Exchange	Market Value (trillions of USD)	Total Share Turnover (trillions of USD)
<a href="#"><u>NYSE Euronext</u></a>	20.7	28.7
<a href="#"><u>Tokyo Stock Exchange</u></a>	4.63	5.45
<a href="#"><u>NASDAQ</u></a>	4.39	12.4
<a href="#"><u>London Stock Exchange</u></a>	4.21	9.14
<a href="#"><u>Shanghai Stock Exchange</u></a>	3.02	3.56
<a href="#"><u>Hong Kong Stock Exchange</u></a>	2.97	1.7
<a href="#"><u>Toronto Stock Exchange</u></a>	2.29	1.36
<a href="#"><u>Frankfurt Stock Exchange (Deutsche Börse)</u></a>	2.12	3.64
<a href="#"><u>Madrid Stock Exchange (BME Spanish Exchanges)</u></a>	1.83	2.49
<a href="#"><u>Bombay Stock Exchange</u></a>	1.61	0.263
<a href="#"><u>National Stock Exchange of India</u></a>	1.46	0.564



# Financial Markets



## Some Stock Markets Indices

### **CAC 40 Index** – *Cotation Assiste' en Continu*

40 biggest companies on Paris Bourse

### **DAX 30** – *Deutsche Aktienindex*

30 largest and most liquid listed companies

### **Dow Jones Industrial Average Index (price-weighted)**

30 stocks chosen by Wall Street Journal editors

### **FTSE Actuaries All-Share Index and FTSE 100 Index**

*Financial Times Stock Exchange Index*

Quarterly 100 top market capitalization in London Stock Exc.

### **MSCI Emerging Markets Free Index**

Tracks the performance of 25 emerging-market countries



# Financial Markets



## Some Stock Markets Indices

### **NASDAQ 100**

*National Association of Securities Dealers Automated Quotations*

Top 100 companies traded on Nasdaq, mostly tech companies

**Nikkei 225 Index** – Published by the business daily *Neihon Keizai Shimbun*

top 225 of the Tokyo Stock Exchange

### **Standard & Poor's 500 Index**

Reflect the performance of the largest US companies by market capitalisation



# Financial Markets



## The Portuguese Stock Market Indices

### ***PSI -20***

### ***PSI Geral***

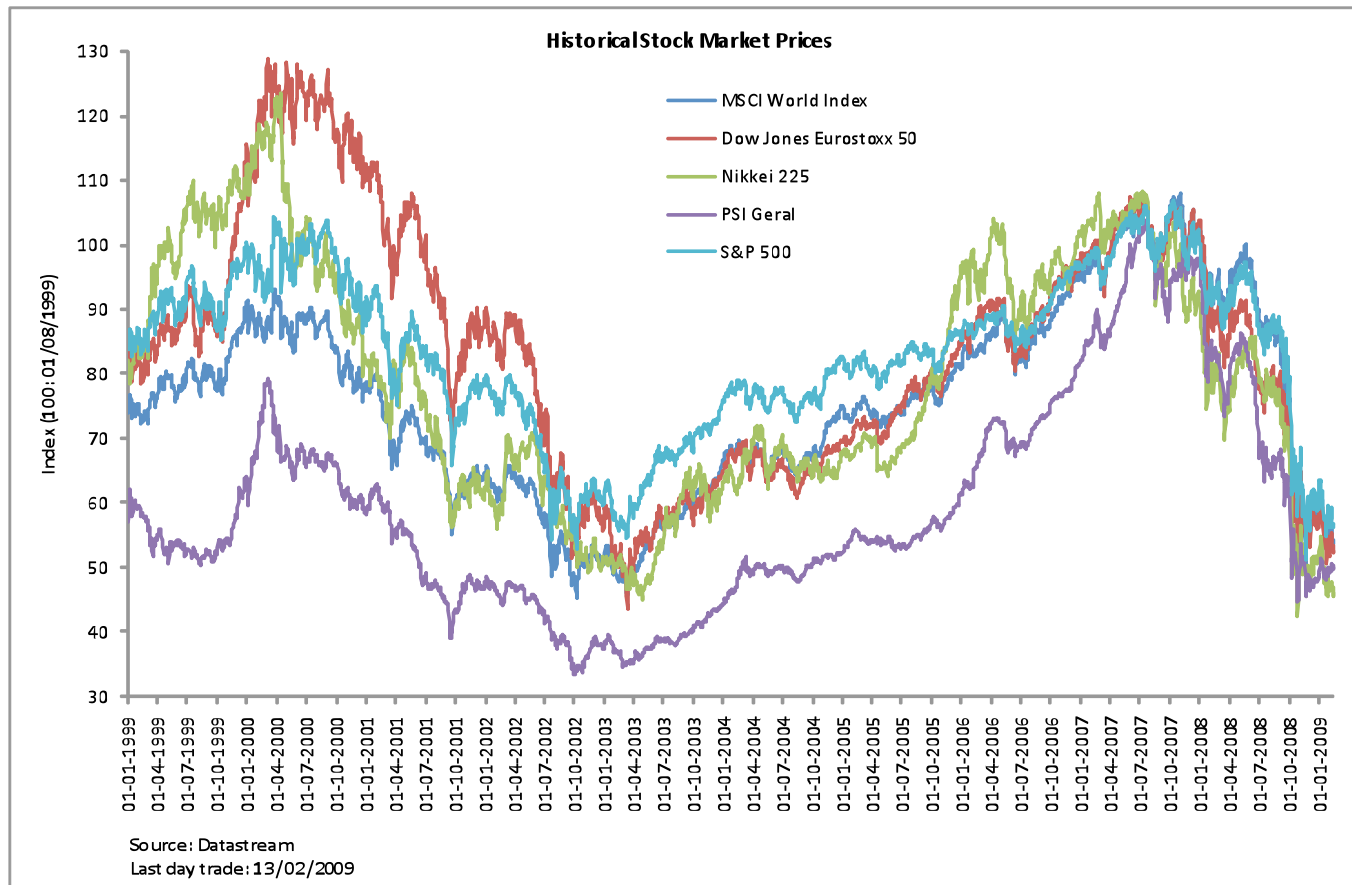
### ***PSI Sectoriais (9 industries)***

The index management, calculation and disclosure are assured by *Euronext Índices B.V.*, which is *Euronext* company, conjointly a specialized committee, *Euronext Index Steering Committee*.

PSI-20 is an price index computed with a sample of 20 stocks issues negotiated in the Mercado de Cotações Oficiais. PSI-20's basis value was 3000 points, refereed to December 31, 1992 close price. The index value is disclosed each 15 seconds by Euronext Lisbon, during the treading period.

Currently, the 20 companies listed are chosen based on their size (number of shares outstanding), free float (number of shares owned by small investors), predictable liquidity (number os trades performed), regularity and continuity of price formation. The index composition is review semi annually.

## Time evolution of some indices





# Financial Markets



## Time evolution of the S&P500





# Financial Markets



## Time evolution of some indices

<http://www.google.com/finance?q=INDEXSP:.INX>



# Financial Markets



## Example: Price-Weighted Average

Portfolio: Initial value  $\$25 + \$100 = \$125$

Final value  $\$30 + \$90 = \$120$

Percentage change in portfolio value

$$= -5/125 = -.04 = -4/100 \rightarrow -4\%$$

Index: Initial index value  $(25+100)/2 = 62.5$

Final index value  $(30 + 90)/2 = 60$

Percentage change in index  $-2.5/62.5$

$$= -.04 = -4\%$$





# Financial Markets



## Stock Exchange / OTC

**Exchange:** Anonymous, standardization of products and transactions

***Over the Counter:*** Bilateral agreements, tailor made



# Financial Markets



## Return and Risk

### Return

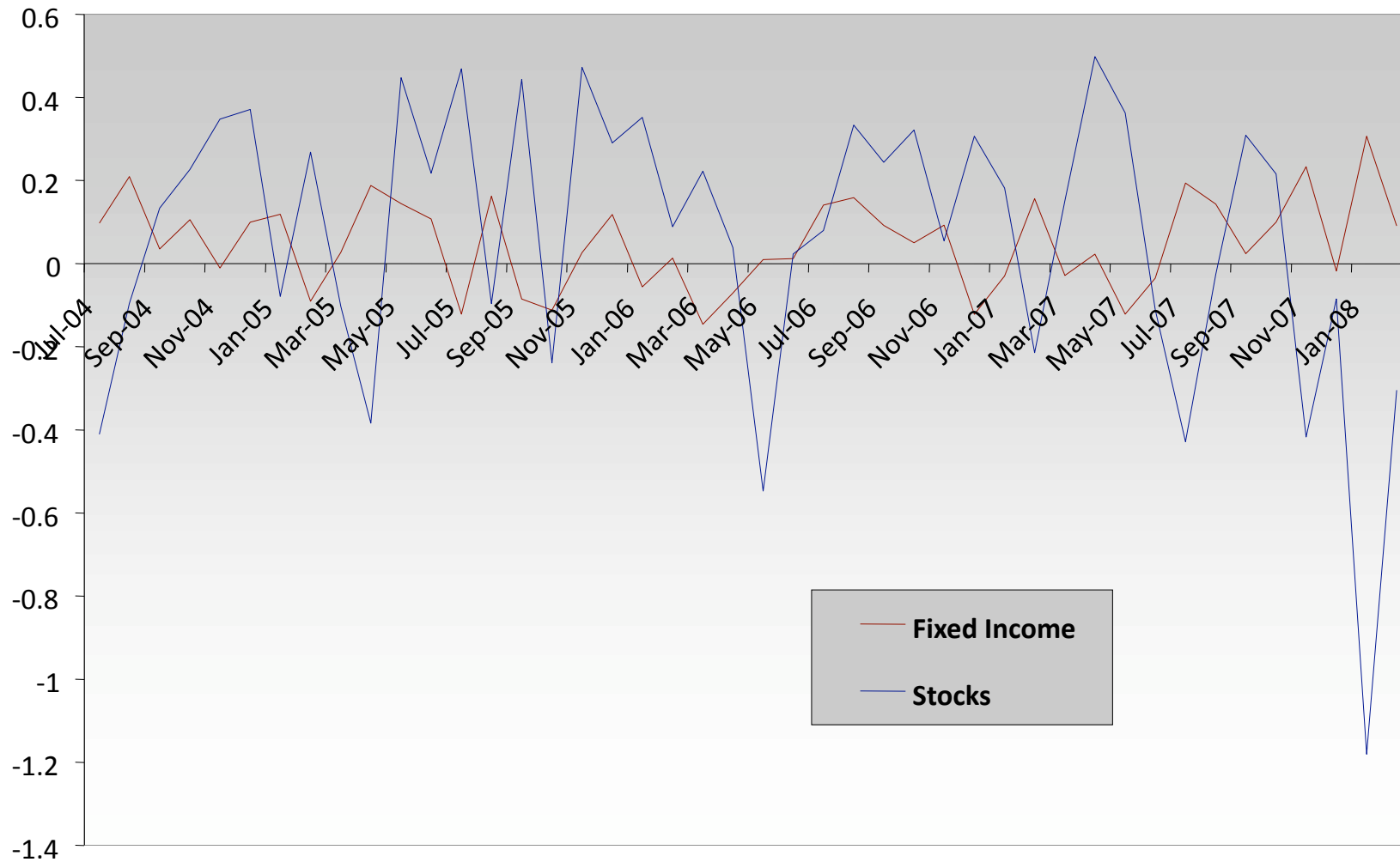
Refers to the percentage change in the value of a security (or of a portfolio) over a period of time. Usually, it includes the change in value and the periodical remuneration (interest or dividends)

### Risk

Represents the possibility of the realized return on a security (or of a portfolio) being different from its expected return.

We will use standard deviation (or, alternatively variance) to quantify risk.

The standard deviation is a well-know statistical measure that quantifies the dispersion of a random variable around its expected value.





## Type of Orders

### 1. Market Order

- An investor placing a market order is certain that the order will be executed but there is uncertainty about the price the order will be executed;
- The broker is obligated to act on a “best-efforts” basis to obtain the best possible price for the investor.

### 2. Limit Order

- A “limit price” must be specified by an investor that places a limit order;
- If the limit order is to sell shares, then the order will be executed only at a price that is great or equal than the limit price;
- If the limit order is to buy shares, then the order will be executed only at a price that is lower or equal than the limit price;
- An investor placing a limit order cannot be certain that the order will be executed.



## Type of Orders

### 3. Stop Order

- A “stop price” must be specified by an investor that places a stop order;
- If the stop order is to sell shares, then the stop price must be below the market price at the time the order is placed;
- Conversely, if the stop order is to buy shares, then the stop price must be above the market price at the time the order is placed;
- If someone trades the stock at a price that reaches or passes the stop price, then the stop order becomes a market order.

### 4. Stop Limit Order

- Two prices must be specified by an investor that places a stop limit order: a stop price and a limit price;
- If someone trades the stock at a price that reaches or passes the stop price, then the stop limit becomes a limit order.

## Price-Contingent Orders

		Condition	
		Price below the Limit	Price above the Limit
Action	Buy	Limit-Buy Order	Stop-Buy Order
	Sell	Stop-Loss Order	Limit-Sell Order

**FIGURE 3.5** Price-contingent orders



# Financial Markets



## Public Offers

A **public offer** in the capital market is business proposal made to all investors. The specific name given to the operation depends on the specific business feature. We have the following types of public offer:

- o **OPS** oferta pública de subscrição/**IPO** initial public offer or **SEO** Seasoned equity offering
- o **OPV** oferta pública de venda/**SEO** secondary equity offering
- o **OPA** oferta pública de aquisição/**Takeover** (friendly or hostile)
- o **OPT** oferta pública de troca/**PEO** public exchange offer



# Financial Markets



## Public Offers

- **Oferta Pública de Subscrição/Initial Public Offering/Seasoned Equity Offering** a company or investment fund that will issue securities (stock, bonds or units in investment funds) asks to all investors to subscribe them;
- **Oferta Pública de Venda/Secondary Equity Offering** a company or investment fund that will issue securities (stock, bonds or units in investment funds) asks to all investors to buy them;
- **Oferta Pública de Aquisição/Takeover** a company or investment fund asks to all investors to sell it all their securities;
- **Oferta Pública de Troca/Public Exchange Offer** a company or investment fund asks to all investors to exchange a specific security with other specific security.





# Financial Markets



## Trading Costs

- Commission: fee paid to a broker for making the transaction
- Spread: cost of trading with dealer
  - Bid: price dealer will buy from you
  - Ask: price dealer will sell to you
  - Spread: ask - bid
- Combination: on some trades both are paid

## Types of Financial Risks

1. Credit Risk
2. Operational Risk
3. Liquidity Risk
4. Market Risk

## Credit Risk

**Credit Risk** is the risk that an obligor does not honour his payments obligations

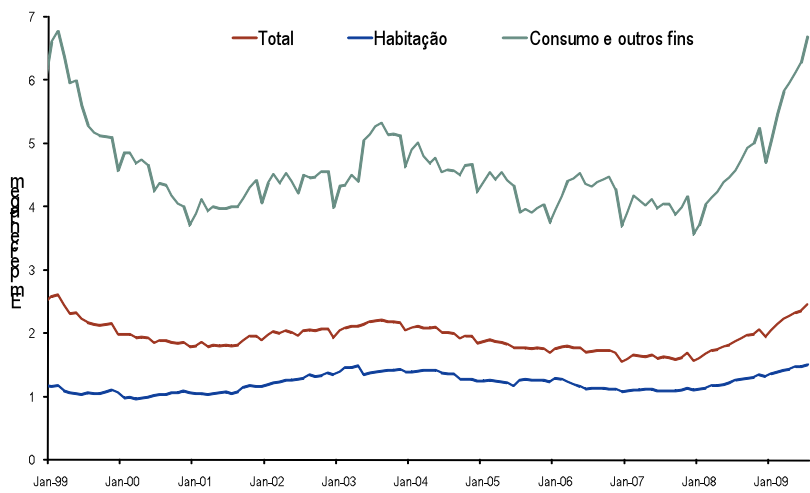
There is credit risk associated with

- Loans to households
- Loans to firms
- Bonds issued by the corporate sector or the government
- ...

# Credit Risk

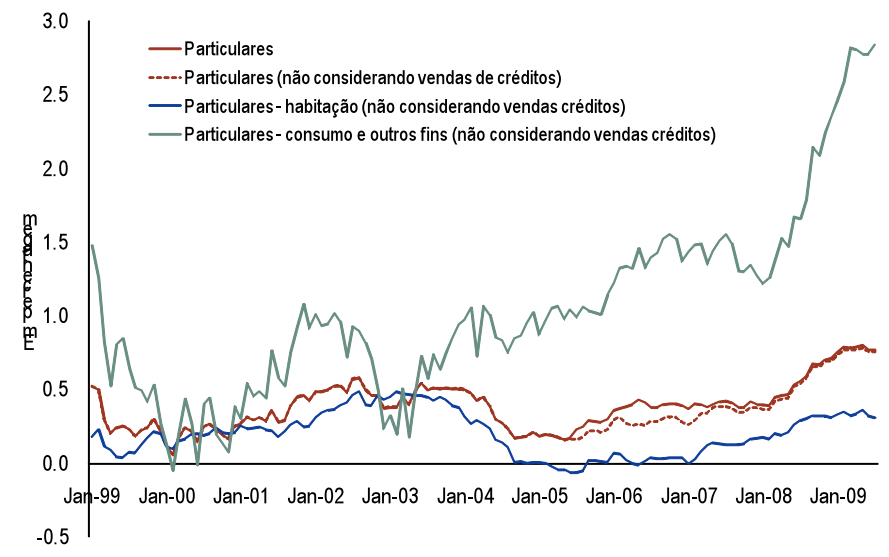
- Concerning loans granted by Portuguese banks, a materialization of credit risk has been observed in the recent past

### Default ratios



Source: Banco de Portugal

### New overdue credit (as a percentage of credit adjusted for securitisations operations)





# Credit Risk

Rating agencies evaluate the risk of default

Rating companies

Moody's Investor Service

Standard & Poor's

Fitch

Rating Categories

Investment grade

Speculative grade/Junk Bonds

Bond Ratings									
	Very High Quality		High Quality		Speculative		Very Poor		
Standard & Poor's	AAA	AA	A	BBB	BB	B	CCC	D	
Moody's	Aaa	Aa	A	Baa	Ba	B	Caa	C	
<p>At times both Moody's and Standard &amp; Poor's have used adjustments to these ratings:            S&amp;P uses plus and minus signs: A + is the strongest A rating and A - the weakest.            Moody's uses a 1, 2, or 3 designation, with 1 indicating the strongest.</p>									
Moody's	S&P								
Aaa	AAA	Debt rated Aaa and AAA has the highest rating. Capacity to pay interest and principal is extremely strong.							
Aa	AA	Debt rated Aa and AA has a very strong capacity to pay interest and repay principal. Together with the highest rating, this group comprises the high-grade bond class.							
A	A	Debt rated A has a strong capacity to pay interest and repay principal, although it is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than debt in higher-rated categories.							
Baa	BBB	Debt rated Baa and BBB is regarded as having an adequate capacity to pay interest and repay principal. Whereas it normally exhibits adequate protection parameters, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity to pay interest and repay principal for debt in this category than in higher-rated categories. These bonds are medium-grade obligations.							
Ba	BB	Debt rated in these categories is regarded, on balance, as predominantly speculative with respect to capacity to pay interest and repay principal in accordance with the terms of the obligation. BB and Ba indicate the lowest degree of speculation, and CC and Ca the highest degree of speculation. Although such debt will likely have some quality and protective characteristics, these are outweighed by large uncertainties or major risk exposures to adverse conditions. Some issues may be in default.							
B	B								
Caa	CCC								
Ca	CC								
C	C	This rating is reserved for income bonds on which no interest is being paid.							
D	D	Debt rated D is in default, and payment of interest and/or repayment of principal is in arrears.							

## Credit Risk

### Credit Default Swaps

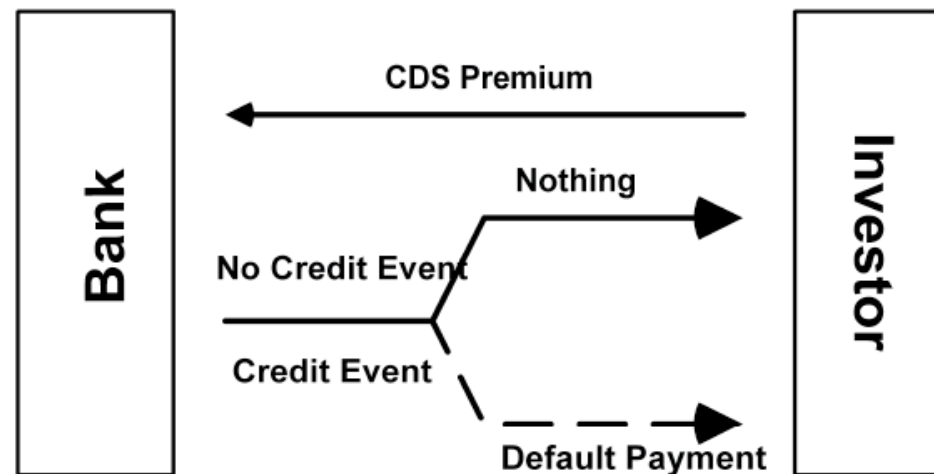
**Credit Default Swaps** are used to isolate the risk of default on credit obligations.

In a CDS contract the protection seller agrees to pay the default payment to the protection buyer if default occurs. As an exchange for the default protection the buyer usually pays periodic fixed payments to the seller. The default payment is an amount to cover the loss. As soon as the default payment took place, the CDS contract terminates

# Credit Risk

## Credit Default Swaps

Cash-flows:





## Credit Risk

### Three different specifications for the default payment of a CDS

the notional amount of the defaulted asset minus the market value of the asset after the default event (cash settlement)

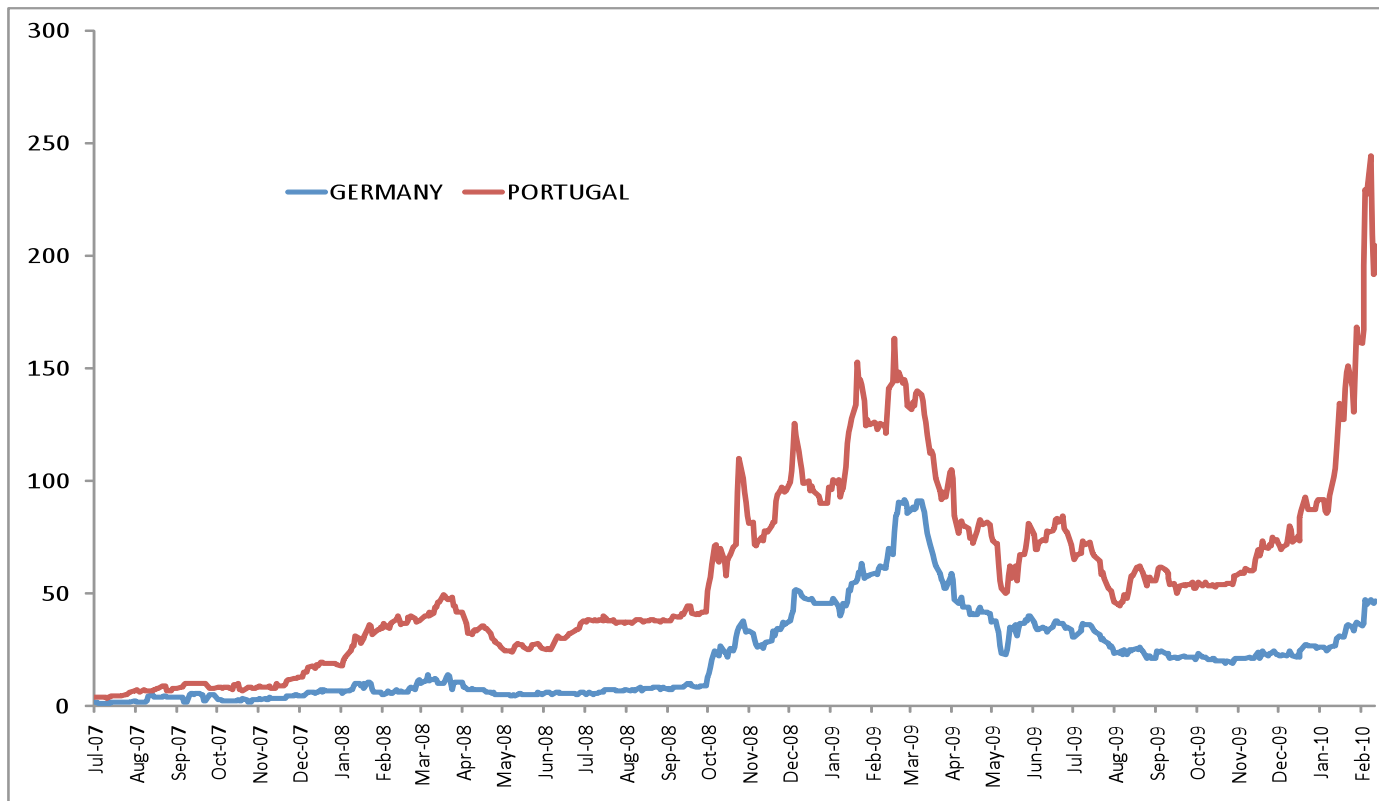
a pre-agreed fixed percentage of the notional amount

repayment of notional amount for the physical delivery of the defaulted asset to the protection seller (physical settlement)

The CDS premium (or spread) is defined as the price for the default protection that has to be paid to the protection seller such that the contract has an initial value of zero. This amount is usually quoted in basis points per year (bp/a).

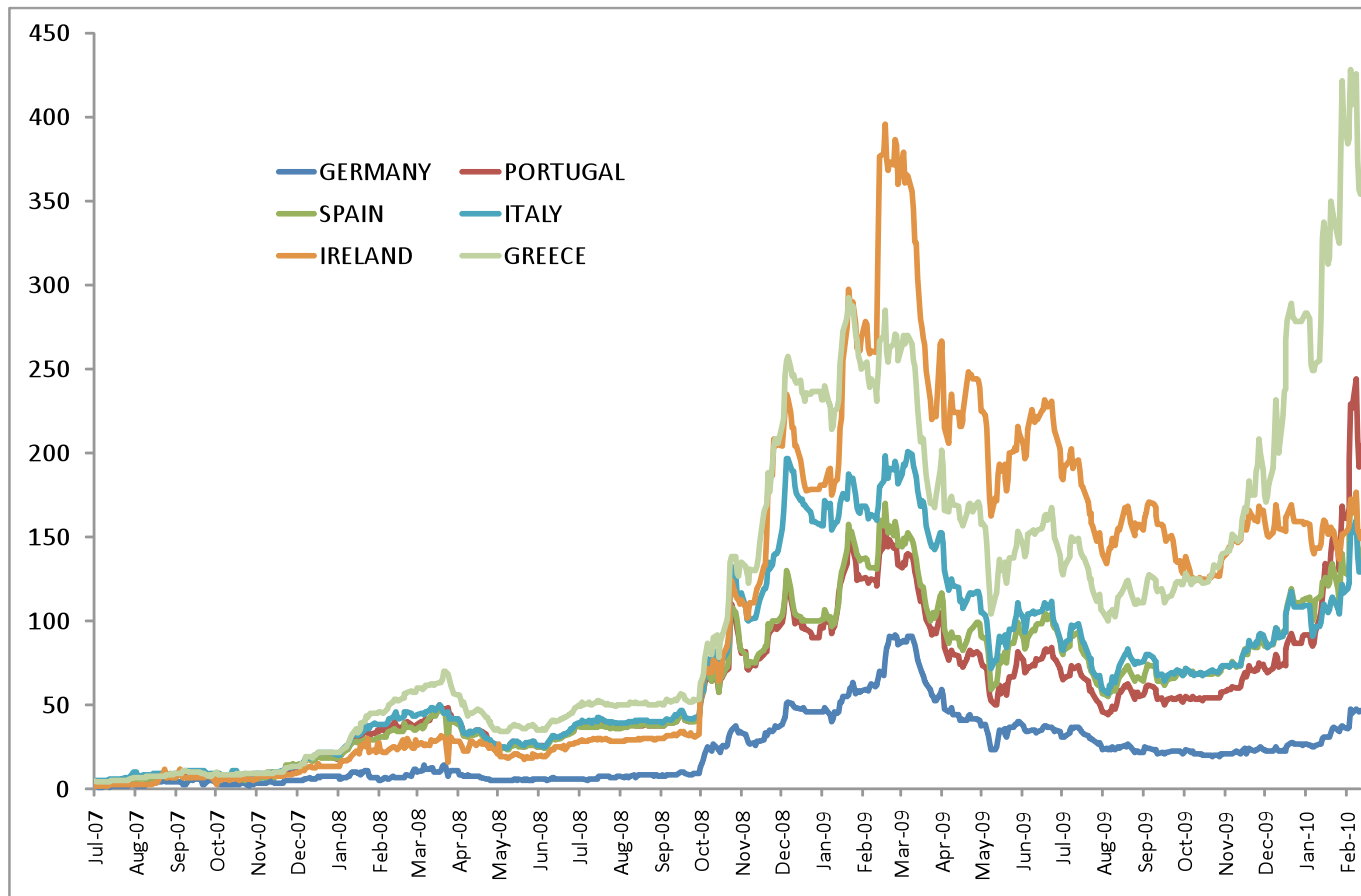
# Credit Risk

## CDS spreads for Portuguese Government Bonds



# Credit Risk

## CDS spreads for some euro area countries



# Operational Risk

**Operational Risk** is the risk arising from execution of a company's business functions and concerns

- Inadequate or failed systems;
- Management and operational error;
- Human error;
- Legal risk;
- Fraud ...



## Liquidity Risk

**Liquidity Risk** is the impossibility of trading in the market at the prevailing price due to illiquidity.

## Market Risk

**Market Risk** is the risk that the value of a portfolio, either an investment portfolio or a trading portfolio, will decrease due to the change in value of the market risk factors. The four standard market risk factors are stock prices, interest rates, foreign exchange rates, and commodity prices. The associated market risk are:

- *Equity risk*, the risk that stock prices and/or the implied volatility will change.
- *Interest rate risk*, the risk that interest rates and/or the implied volatility will change.
- *Currency risk*, the risk that foreign exchange rates and/or the implied volatility will change.
- *Commodity risk*, the risk that commodity prices (e.g. corn, copper, crude oil) and/or implied volatility will change.