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3ºE2 - Spring 2026

Mercados Financieros

L5 – Fix Income Markets

March 18th, 2026

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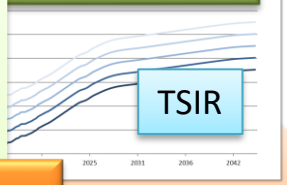
Summary of previous classes

#	Lesson
1	The financial system
2	Central Banks
3	Money markets and interest rate risk
4	Credit institutions
5	Other financial institutions
6	Capital markets and fixed income
7	Equity markets
8	Sovereign debt market
9	Derivatives

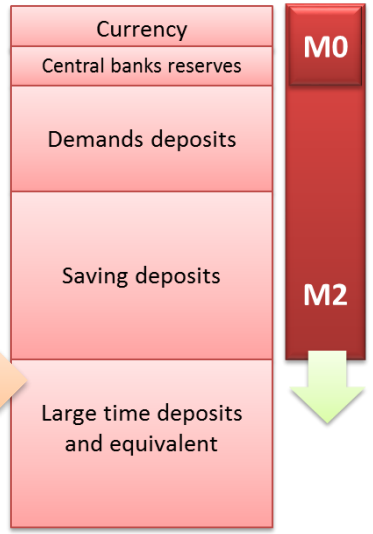
And monetary policy

SWAPs, FRAs…

Institutions
Stability
Monetary Policy



Interest rate



Banks

Loans

Insurance and pensions Co.

Institutions

Financial assets & markets

Bonds

Stocks

Public bonds

Markets
Risk & return
Corporate Finance

Those who don't know history are doomed to repeat it.
Until now: German hyperinflation, George Soros and the British Pound, Lehman Brothers, greek government-debt crisis, Bretton Woods…
From now: We will see…

What are we going to do?

- **Capital market**
  - Markets & financial assets
  - Primary and secondary markets
  - Regulation & supervision
  - Service Investment companies
  - Return & risk
- **Fixed income**
  - Yield to maturity
  - Callables
  - Convertibles bonds
  - Duration – Convexity – Inmunization
  - The Term Structure of Interest Rates
  - Passive management vs. Active Management
- **Case: Pescanova**

L6. Capital markets and fixed income

The 6th: Collective Investment Schemes and Venture Capital:

- Investment funds
- SICAVs
- SOCIMIs
- Hedge funds
- Venture Capital

Markets & financial assets

Remembering from first day:

What is a market?

- is a place,
- where products (or services) are **traded**,
- between buyers and sellers,
- that has **rules**,
- and **agents** that help.

Value and price

The need of rules: *to protect investors, maintain fair, orderly, and efficient markets… and operating rules (ex: to become a broker or Initial Public Offers IPOs).*

What is a financial asset?

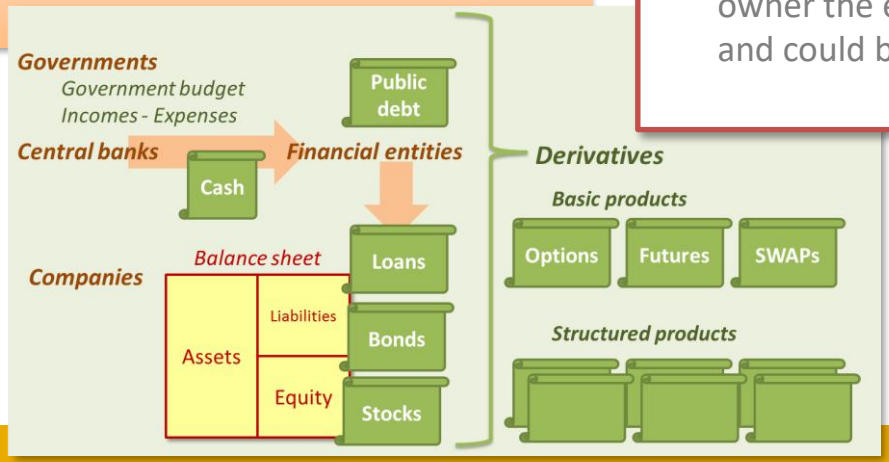
- *A financial asset is an **intangible asset** that derives value because of a **contractual claim**.*
- *Main three characteristics: **Return**, **risk** and **liquidity**.*

A financial asset is any asset that is:

- Cash and equivalent,
- Equity instruments,
- Contractual right to receive cash or another financial asset from other part.
- A contract that will or may be settled by its owner the entity's own equity instruments and could be non-derivate or a derivate.

(See IAS 32 at Moodle)

RISK



Markets & financial assets

- **Primary Market.** A market that issues new securities.
- **Secondary Market.** The market in which previously issued financial instruments are bought and sold.

Have we seen any example in class?

Yes, public debt market. While primary market rules through an auction system, in the secondary market, financial assets are directly traded between parties. Both are supervised by Banco de España.

Financial assets traded on Capital Markets:

- Equities
- Pre-emptive rights
- Bonds
- Promissory notes
- Mortgage notes
- Securitization bonds – Asset Backed Securities, Mortgage Backed Securities
- Convertible Bonds
- Warrants and other derivatives like Options and Futures
- Sovereign Debt, etc…

Main Spanish Secondary Markets:

- 4 Bolsas and Sociedad de Bolsas: trading of equities (+ warrants, ETFs, etc.) and some fixed income
- AIAF: fixed income market
- MEFF: Futures and Options
- The Sovereign Debt Market

Capital markets regulation

- The European Passport (1996). A system which allows financial services operators legally established in one Member State to establish/provide their services in the other Member States without further authorisation requirements.
- Investor protection as the main objective of capital markets regulation
- **Ley 24/1988 de 28 de julio del Mercado de Valores**: a comprehensive reform of Spanish capital markets. This law introduces:
  - The establishment of the **SCLV**. The representation of securities by book entries was the main reason behind the establishment of the SCLV.
  - Establishment of the **CNMV as the capital markets supervisor**
  - **Sociedades Rectoras de las Bolsas** are established, one for each Bolsa (Madrid, Barcelona, Bilbao and Valencia)
  - The **SIB** is created. The SIB is an electronic platform which connects the four markets. It is regulated by the Sociedad de Bolsas
  - Agentes de Cambio y Bolsa are replaced with **Sociedades and Agencias de Valores**
- Law 37/1998 amended the 1988 rule and **allowed credit institutions to operate in the Stock Market** performing the same activities than the Sociedades and Agencias de Valores

CNMV (Comisión Nacional del Mercado de Valores)

- The CNMV is a **public entity** in charge of:
  - Market transparency
  - Investor protection
- **What entities are subject to CNMV's supervision?**
  - "Sociedad de Bolsas" and "Sociedades Rectoras de las Bolsas"
  - SCLV – clearing and settlement (Iberclear)
  - "Empresas de Servicios de Inversión"
  - Asset managers
  - Credit institutions when operating in financial markets
  - Issuers
- **The CNMV is also in charge of the correct functioning of the primary and secondary markets (except Spanish sovereign debt and interbank market):**
  - Filing prospectus of new issues
  - Regulation and decision making about IPOs, takeovers, etc
  - Information to investors and market statistics
  - Privileged and non-public information

Empresas de Servicios de Inversión

- If you want to invest in capital market securities, you can either use credit institutions (banks, savings banks…) or **Investment Services Companies (ISC)**. Three types of ISCs are:
  - **Sociedades de Valores (SV).** They can trade on their behalf or on behalf of third parties, they can underwrite issues and finance long positions
  - **Agencias de Valores (AV).** AVs can only trade on behalf of third parties. AVs cannot either underwrite any issues or finance long positions
  - **Sociedades Gestoras de Carteras (SGC).** SGCs can only perform portfolio management activities according to the guidelines set by their clients on the management contracts

ISC must meet minimum capital requirements. Additionally, SVs and AVs must join the **Fondo de Garantía de Inversiones**

FOGAIN – Fondo de Garantía de Inversiones.

System to protect the financial investors (as FGD for deposits) in case: established to compensate to those clients of any of the adhered entities in respect of which the following occurs:

- The adhered firm becomes insolvent
- The investor is not able to recover what he put at the disposal of the adhered investment firm

Subject to supervision by CNMV

Maximum compensation quantity in Spain: €100.000

Empresas de Servicios de Inversión

Renta 4 compra una ficha bancaria a Banesto por 15 millones de euros

Renta 4 ha recibido la autorización del Banco de España para adquirir el 100% del capital del Banco Alicantino de Comercio a Banesto.

(link: 07-02-2011)

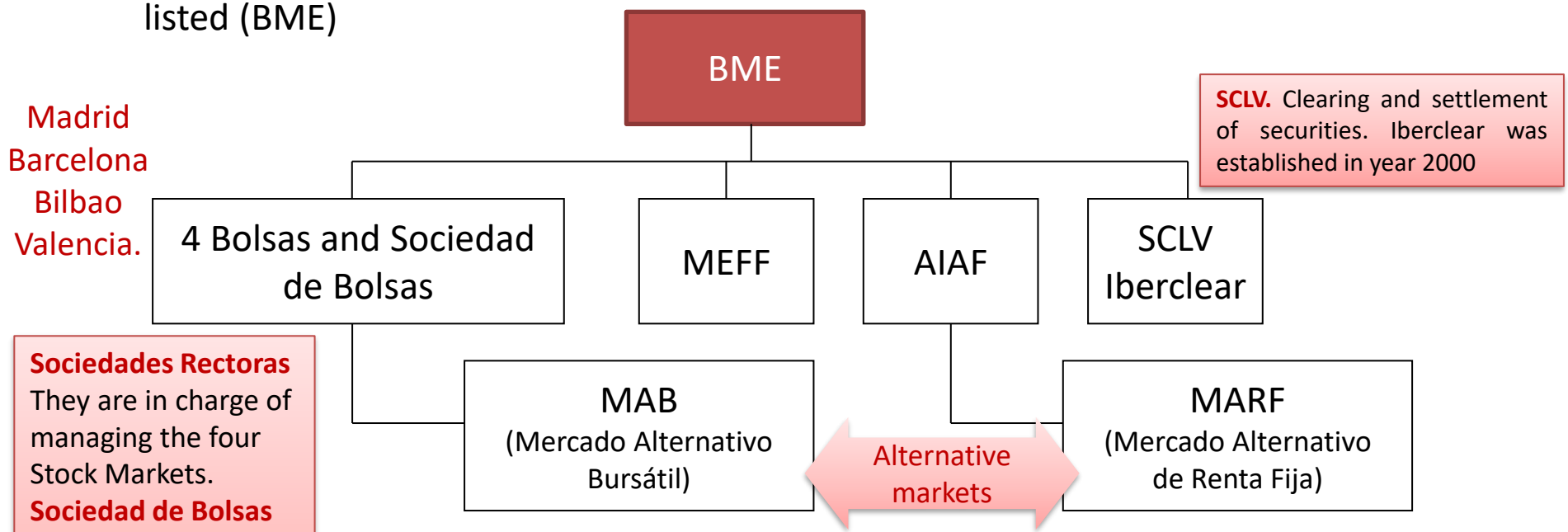
	2013 market share – Bolsa
BBVA	18.3%
Sabadell	9.5%
Santander Investment	7.9%
Morgan Stanley	6.8%
Merrill Lynch	6.4%
Société Générale	5.8%
Credit Suisse	5.7%

Source: BME, 2013

https://www.youtube.com/watch?v=MwKYjZ_8EcE

Bolsas y mercados españoles

In 2001 all markets were integrated under a new holding company which was listed (BME)



SCLV. Clearing and settlement of securities. Iberclear was established in year 2000

Sociedades Rectoras
They are in charge of managing the four Stock Markets.
Sociedad de Bolsas
Company owned by the four Rectoras, in charge of managing the SIB

MAB

- Focused on small caps, with a tailor-made regulation and lower costs for the issuers
- Both institutional and retail investors.

MARF

- Fixed income alternative market for small companies, aimed at institutional investors
- Conditions required to tap the market are more flexible and not so demanding
- All issues must be rated - A rating agency must release a credit quality research report on any issue

Bolsas y mercados españoles

AIAF

- Fixed income market aimed at institutional investors
- Traded securities: bonds, promissory notes, mortgage notes, securitization bonds, etc.

MEFF

- Active since 1989
- Equity options, Ibex-35 options
- Equity futures and Ibex-35 futures
- MEFF performs the role of a clearing house. Trades executed on regulated futures exchanges are guaranteed by a clearing house. The clearing house becomes the buyer to each seller, and the seller to each buyer, so that in the event of a counterparty default the clearer assumes the risk of loss. This enables traders to transact without performing due diligence on their counterparty

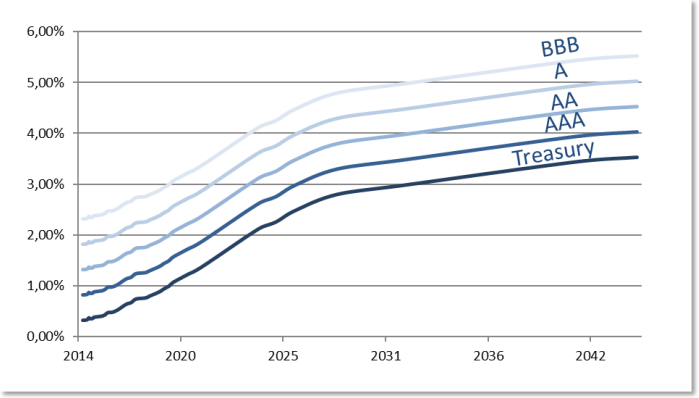
Why somebody will be interested in hedging other person's risks?

Risk & return

Security

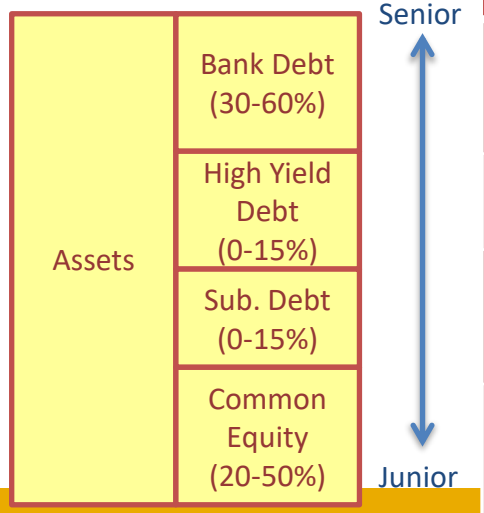
Risk free assets
Loans with guarantees
Corporate bonds
Consumer lending
Mezzanine
Stocks

Uncertainty



Can we predict the future?
No.
But we can earn money with uncertainty.

How can we deal with uncertainty?



Expected returns	Key Characteristics
4% - 8%	- Low financing costs - Lowest default risk - Floating rate
8% - 14%	- Typically fixed rate - Pre-payable penalties
15% - 20%	- Debt service paid pre-taxes - Highest default risk compared with other debt.
20% - 40%	- Riskiest security in capital structure - No downside protection with unlimited upside potential.

It is all about information.
Efficient market hypothesis and more…

Why somebody will be interested in hedging other person's risks?

Risk & return

Financial Leverage: loans, risk and return - **Corporate Finance**

There is a company with 1M€ EBITDA per year, and we believe it can be maintained over time.

1	2	3	4	5	6	7	…
1M€	1M€	1M€	1M€	1M€	1M€	1M€	1M€
-0,3M€	-0,3M€	-0,3M€	-0,3M€	-0,3M€	-0,3M€	-0,3M€	-0,3M€

at 10%

It is bought by **10M€**

It is sold by **12,5M€**

A **5M€** loan is asked, with a rate of **6%**.Only financial expenses are paid.

After **4 years**, the viability of the company is checked and we prove the managers of a pension fund the stability of cash flows. Company is sold at a rate of **8%** and we pay back the **5M€** loan.

The deal:

TIR=21%

0	1	2	3	4
-5M€	0,7M€	0,7M€	0,7M€	7,5M€

Fixed Income - Introduction

On day 5 we talked about bonds… (while talking about interest rate risk and TSIR).

What is a Bond?

IOU note (I owe you)

- The issuer: borrower
- Investor: lender
- Face value: amount borrowed
- Maturity date: term
- Coupons: fixed at issuance

The investor in a fixed income instrument is a creditor. The investor gets paid back according to the established amortization schedule.

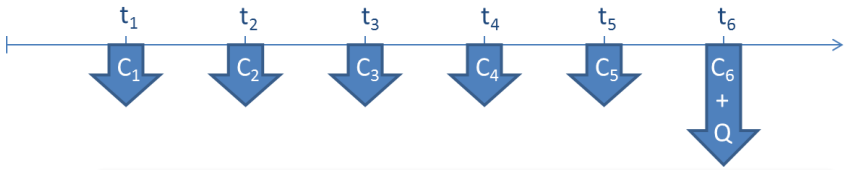
The return to the investor comes from the coupons

- Sovereign Fixed Income: issued by Sovereigns
- Private Fixed Income: issued by corporates

Maturity $= t_6$

Price $= VA(C_1) + VA(C_2) + \ldots + VA(C_6 + Q)$

Duration $= \dfrac{t_1 \cdot VA(C_1) + t_2 \cdot VA(C_2) + \ldots + t_6 \cdot VA(C_6 + Q)}{VA(C_1) + VA(C_2) + \ldots + VA(C_6 + Q)}$



Careful with confusing the discounting rate for correct pricing (spot of TSIR) with the Yield to Maturity (IRR of future cash flows) considering actual Price.

Fixed Income - Introduction

A Bond is issue without discount, with maturity of 3 years, facial of 1.000€ and three coupons of 100€ to be paid yearly. Interest rate is 9%. Calculate price and duration.

Tiempo	0	1	2	3
Emisión	P			1.000,00
Pago		100,00	100,00	100,00

$$P = \frac{100}{1,09} + \frac{100}{1,09^2} + \frac{1.100}{1,09^3} = 1.025,31\ €$$

$$V_1 = \frac{100}{1,09} = 91,74\ €$$

$$V_2 = \frac{100}{1,09^2} = 84,17\ €$$

$$V_3 = \frac{1.100}{1,09^3} = 849,40\ €$$

$$duration = \frac{1 \cdot 91,74 + 2 \cdot 84,17 + 3 \cdot 849,40}{1.025,31} = 2,74 \text{ years}$$

Fixed Income - Introduction

Main risks born by the investor:

- Credit risk or default risk
- Interest rate risk: the return to the investor is NOT fixed, since it is influenced by the evolution of the instrument's market value, which is in turn related to the evolution of interest rates
- High inflation rates turn Fixed Income a less attractive investment

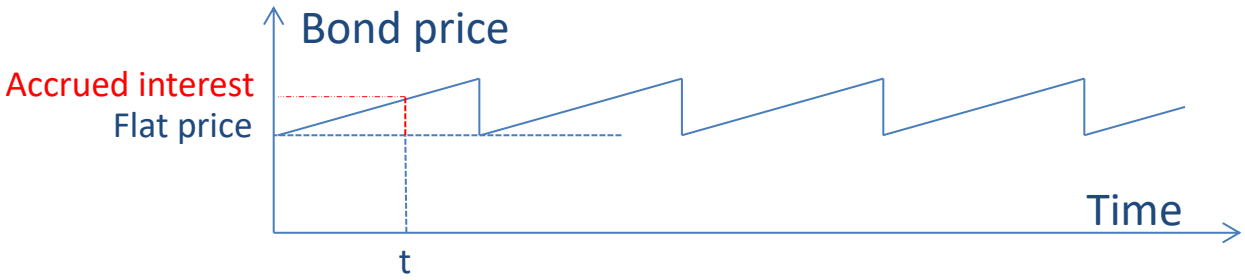
Main types of Bonds:

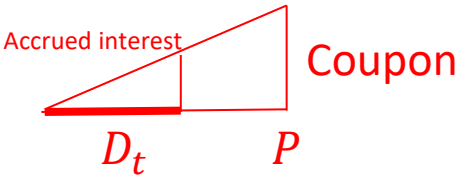
- Bills (<1year), notes (1<maturity<10years) and bonds (10 years<maturity)
- Indexed
- Profit-Sharing
- Convertibles, etc…

Fixed Income – Main concepts

Accrued Interest (Cupón corrido)

http://www.bde.es/webbde/es/secciones/informes/banota/boletin.html





Bond price (t) = Flat price + Accrued interest

Accrued interest = Coupon $\cdot \frac{D_t}{P}$

E M I S I O N	NUMERO OPERACS	IMPORTE CONTRATADO	PRECIO (EX-CUPON) MEDIO	MAXIMO	MINIMO	RENDTO. INTERNO MEDIO	ANTERIOR PRECIO MEDIO (FECHA)
ES00000123T1 B EST 2.75 31.03.15	1	15,00	100,930	100,930	100,930	0,21	100,945 (12/11/2014)
ES00000123P9 B EST 3.75 31.10.15	2	0,01	103,274	103,288	103,260	0,30	103,326 (12/11/2014)
ES00000122X5 B EST 3.25 30.04.16	4	2,01	104,140	104,163	104,130	0,38	104,170 (11/11/2014)
ES00000123W5 B EST 3.30 30.07.16	1	3,70	104,870	104,870	104,870	0,42	104,900 (11/11/2014)
ES0000012OJ8 O EST 3.80 31.01.17	2	0,03	107,275	107,300	107,250	0,48	107,350 (12/11/2014)
ES00000124I2 B EST 2.10 30.04.17	2	20,00	103,690	103,700	103,680	0,58	103,810 (12/11/2014)

Fixed Income – Main concepts

Clean Price and Dirty Price

The Clean Price is the price of a bond excluding any interest that has accrued since issue or the most recent coupon payment. The Dirty Price is the price of a bond including the accrued interest.

Clean prices are more stable and change for an economic reason. Dirty prices change day to day depending on where the current date is in relation to the coupon dates, in addition to any economic reasons.

Example: €55 annual coupon, payable on October 31st

Bond bought on Sep 8th 2009. In this case, the coupon has been accrued for 308 days

Accrued Coupon = 308*55/360 = €47

Call Provisions. Corporate bonds sometimes include a call option that gives the company – issuer- the right to pay back the debt early.

Seniority. Bonds may be senior claims or subordinated to the senior bonds. If the firm defaults, the senior bonds come first in the pecking order.

Covenants. Covenants are the contract clauses which attempt to reduce the conflicts of interest between debtholders and equityholders.

Fixed Income – Yield to maturity

Yield to maturity

- The price of a two year bond with payments C_1 and C_2 would be : $PV = C_1 / (1+r_1) + C_2 / (1+r_2)^2$
- The first period's coupon is discounted at today's **one-period spot rate** and the second period´s coupon is discounted at today´s **two-period spot rate**. The series of spot rates r_1, r_2, etc… is the Term Structure of Interest Rates (TSIR).
- Rather than discounting each of the coupons at a different rate, we could find a single rate that could give us the same value. This is the IRR of the bond, also known as the Yield to Maturity. **Yields to Maturity do not determine bond prices, it is the other way around**.

The Yield to Maturity is just a simplified measure that assumes a flat interest rate curve with parallel upward and downward movements

So, the formula which relates the price of a bond to its YTM is the following:

$$P = \Sigma C_i / (1+r)^i$$

where P stands for the Price, C stands for the Coupon and r stands for the YTM.

Fixed Income – Yield to maturity

Key variables with an impact on the bond's price:

If	The bond's value
IRR goes up	Goes down
The Coupon goes up	Goes up
The coupon frequency goes up	Goes up

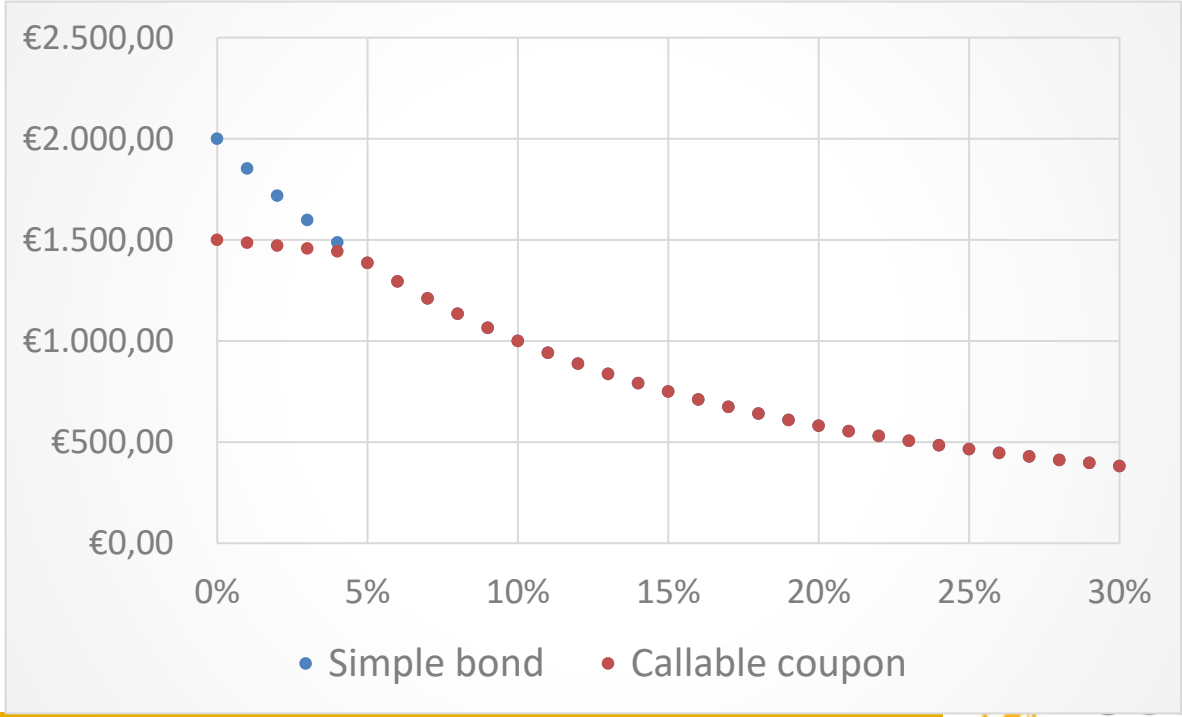
Example

5 yr bond with five 8% annual coupons and a € 1,000 face value. What would its price be if investors require a 9% IRR? What if IRR = 8%? What if IRR = 10%?

Fixed Income – Callables

Price / yield relationship

- The issuer of a callable bond has the right to buy it back at a pre-agreed price before maturity. If interest rates go down, the callable price will increase up to a limit, which is the early redemption price.
- We continue with the same example considering a callable Price of 1.500€.



Fixed Income – Callables

- In order to value a callable bond, it is broken down into two different securities: the normal bond and the issuer's call option

Callable Price = Normal bond's price – value of call option

- The investor in a callable faces two disadvantages:
  - the callable's value is capped and
  - the investor bears reinvestment risk when the bond is redeemed early.
- This is the reason why callables are issued below face value or alternatively pay a higher coupon. The issuer must provide investors with a higher yield in exchange for his early redemption option

Fixed Income – Convertible bonds

- A convertible bond is a type of bond that the holder can convert into a specified number of shares of common stock in the issuing company or cash of equal value. It is a hybrid security with debt- and equity-like features

- The conversion ratio is the number of shares each convertible bond converts into. It may be either explicit or implicit, through the conversion price

Conversion Ratio = Convertible Bond's face value / conversion price

The conversion price is the price per share at which conversion takes place. Quite usually the conversion price implies a discount on the market price, this discount being used as an incentive to the investor

- A convertible bond's value can be broken down into the normal bond's value plus the value of a call option on the underlying equity. Therefore, its total value will be greater than or equal to the value of a normal bond.

Price = Normal bond's price + value of embedded call option

Fixed Income – Duration

Duration $= \dfrac{t_1 \cdot VA(C_1) + t_2 \cdot VA(C_2) + \ldots + t_6 \cdot VA(C_6 + Q)}{VA(C_1) + VA(C_2) + \ldots + VA(C_6 + Q)} = \dfrac{t_1 \cdot \dfrac{C_1}{(1+r)^{t_1}} + t_2 \cdot \dfrac{C_2}{(1+r)^{t_2}} + \ldots + t_6 \cdot \dfrac{C_6 + Q}{(1+r)^{t_6}}}{\dfrac{C_1}{(1+r)^{t_1}} + \dfrac{C_2}{(1+r)^{t_2}} + \ldots + \dfrac{C_6 + Q}{(1+r)^{t_6}}}$

Is the relationship between the present value of the bond's cash flows, weighted with the times until those fixed cash flows are received and

It represents the change in a bond's price when interest rates change:

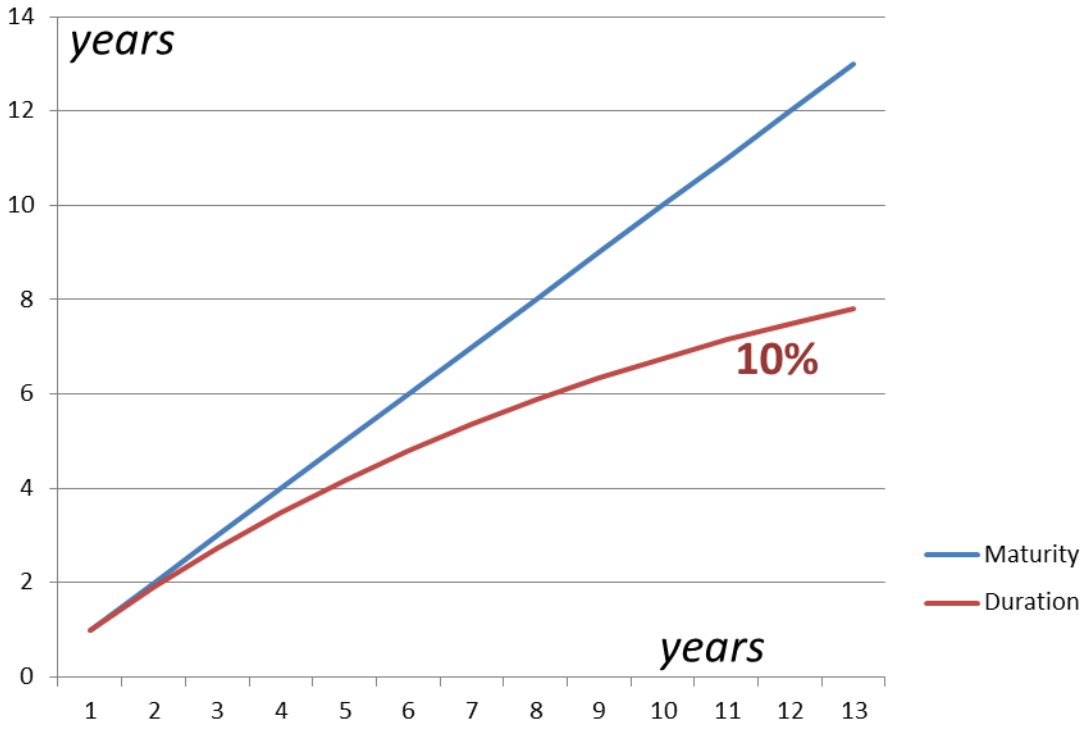
$$\frac{dP}{P} = -D \cdot \frac{dR}{R}$$

Where P stands for the bond's price, R is the interest rate and D is the duration

The longer the duration, the higher the bond's volatility, that is, the higher the bond's sensitivity to changes in interest rates.

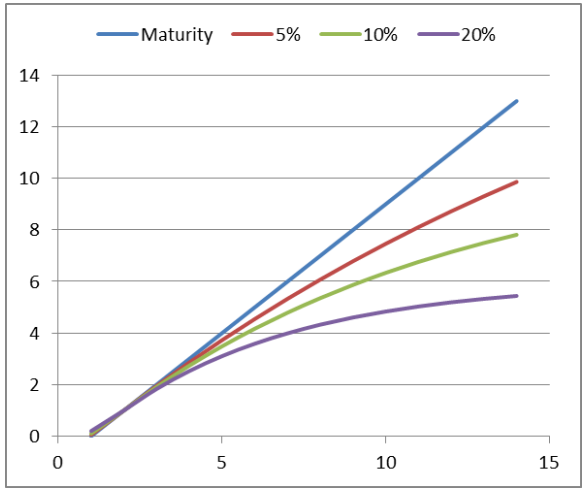
Fixed Income – Duration

Relation between maturity and duration



Following seven variables determine the duration of a bond and, by extension , its volatility or interest rate risk:

- the coupon,
- term to maturity,
- the accrued interest,
- the yield,
- partial redemption,
- advance Refunding
- and time .



Fixed Income – Convexity

For small parallel shifts in the yield curve, the change in value of a bond depends only on its duration. When large changes in interest rates are considered, convexity becomes important

Two bonds change in value by the same percentage for small yield changes. For large interest rate changes, yield reductions have a greater impact on the bond's price than equivalent yield increases. The reason for this is a declining slope of the Price-YTM curve when the yield increases. This is why Convexity is important

Mathematically Duration and Convexity are the first and second derivatives of the bond´s price with respect to the yield.

For small differences between R and R0, the first derivative or Duration concept is enough; for larger differences, we would need to calculate Convexity in order to have a good estimate of the bond´s volatility.

In terms of fixed income management…

- If we expect interest rates to go up, we will move from long durations to short durations and cash positions
- If we expect interest rates to go down, we will overweight long duration instruments

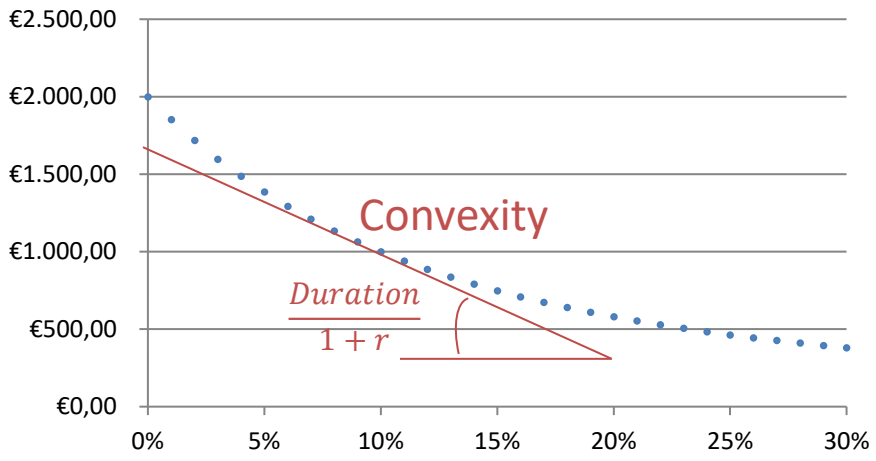
Fixed Income – Duration

Price / yield relationship

A Bond is issue without discount, with maturity of 10 years, facial of 1.000€ and ten coupons of 100€ to be paid yearly. Calculate relationship between price and interest rate.

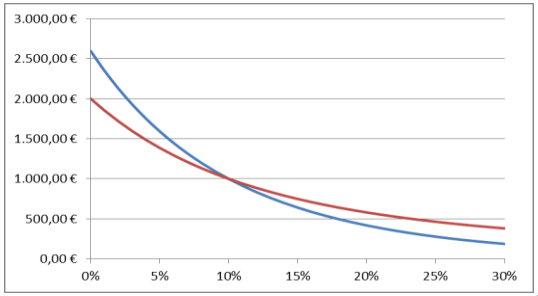
Time	1	2	3	4	5	6	7	8	9	10
Payments	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	1.100,00

$$P = \frac{100}{1+r} + \frac{100}{(1+r)^2} + \frac{100}{(1+r)^3} + \ldots + \frac{100}{(1+r)^8} + \frac{100}{(1+r)^9} + \frac{1.100}{(1+r)^{10}}$$



Compared with a zero coupon bond

$$P = \frac{1.000}{(1+r)^{10}}$$

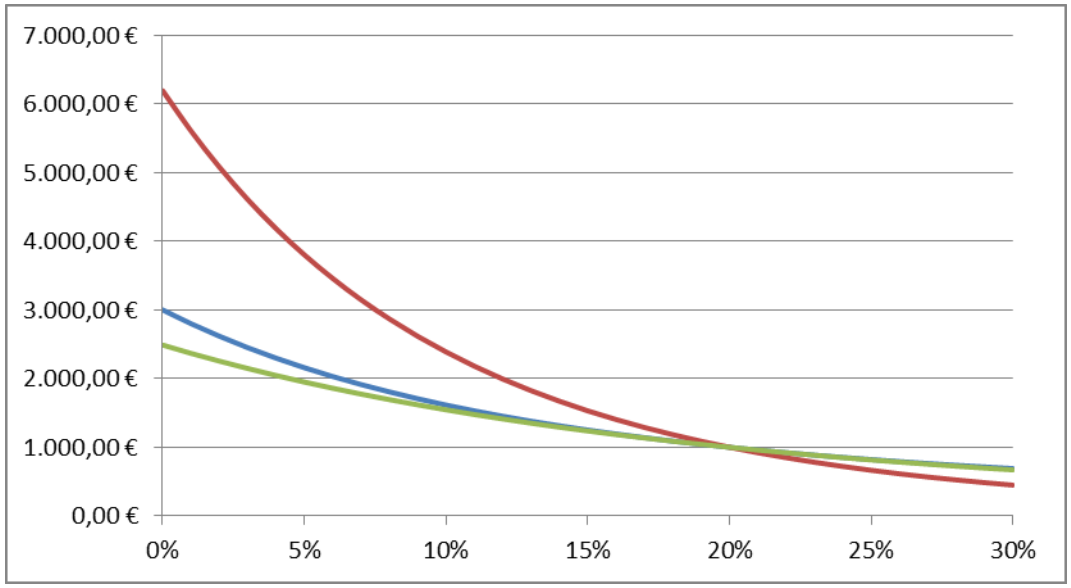


Reinvestment risk

A Bond is issue without discount, with maturity of 10 years, facial of 1.000€ and ten coupons of 200€ to be paid yearly. Interest rate is 20%.

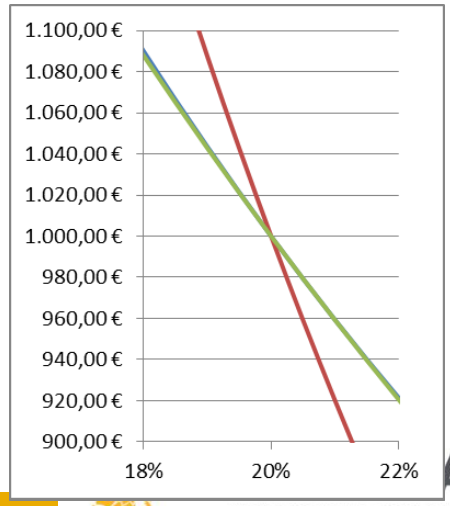
We compare this bond with a zero coupon bond with same price and same maturity.

Tiempo		1	2	3	4	5	6	7	8	9	10
Emisión	- 1.000,00	200,00	200,00	200,00	200,00	200,00	200,00	200,00	200,00	200,00	1.200,00
ZC1	- 1.000,00	-	-	-	-	-	-	-	-	-	6.191,74
ZC2	- 1.000,00	-	-	-	-	2.488,32					



Duration is 5 years.

We compare then with a 5 years zero coupon bond with same price.



Reinvestment risk

Imagine: you have to pay 1.000.000 € in five years time, and current interest rate is 8% so you will need now:

$$\frac{1.000.000}{(1+0{,}08)^5} = 680.583{,}20$$

You buy a bond with facial of 680.583,20€, and 5 coupons at 8%. Maturity = 5 years and Yield to Maturity = 8%

	1	2	3	4	5
- 680.583,20	54.446,66	54.446,66	54.446,66	54.446,66	735.029,85

Total value of coupons and principal = **952.816,48€**

So we reinvest at 8% the coupons:

$\cdot (1{,}08)^4$ $\cdot (1{,}08)^3$ $\cdot (1{,}08)^2$ $\cdot (1{,}08)^1$ $\cdot (1{,}08)^0$

74.074,07	68.587,11	63.506,58	58.802,39	735.029,85

Reinvested total value = **1.000.000,00€**

$\cdot (1{,}07)^4$ $\cdot (1{,}07)^3$ $\cdot (1{,}07)^2$ $\cdot (1{,}07)^1$ $\cdot (1{,}07)^0$

71.368,46	**66.699,49**	**62.335,98**	**58.257,92**	735.029,85

Reinvested total value = **993.691,70 €**

What if interest fails to 7%?

Reinvestment risk

Immunization

How do we prevent from the reinvestment risk?

1) To buy a zero coupon.

What if there are no zero coupon bonds of same maturity?

2) We can combine zero coupon bonds.

680.583,20 at 8% is 1.000.000€ in 5 years.

We have:
- Zero coupon bond 1. Maturity: 7 years
  Yield to maturity: 8%
- Zero coupon bond 2. Maturity: 3 years
  Yield to maturity: 8%

$$P_{bono1} = \frac{1.000}{1{,}08^7} = 583{,}49$$

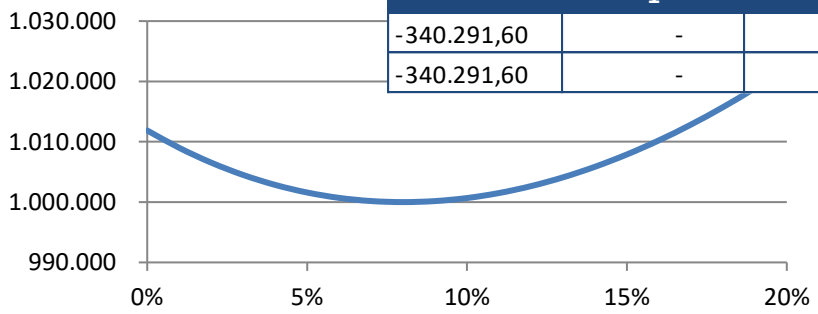
$$P_{bono2} = \frac{1.000}{1{,}08^3} = 793{,}83$$

$w_1 + w_2 = 1$; $w_1 = 1 - w_2$

$7w_1+3w_2=5$; $7-7w_2+3w_2=5$ then $w_2 = 2/4 = 0{,}5$ and $w_1 = 0{,}5$

Then we buy 680.583·0,5=-340.291,60 € of bond 1
and 680.583·0,5=-340.291,60 € of bond 2

	1	2	3	4	5	6	7
-340.291,60	-	-	-	-	-	-	583.200,00
-340.291,60	-	-	428.669,41				



$$V_5 = 428.669{,}41 \cdot (1+i)^2 + \frac{583.200}{(1+i)^2}$$

Reinvestment risk

Immunization

680.583,20 at 8% is 1.000.000€ in 5 years.

Now we have two bonds:

Bond 1: Maturity of 3 years, with annual coupons (8% of interest).
Facial: 1.000€. Price: 1.000€

Bond 2: Maturity of 10 years, with annual coupons (7% of interest).
Facial: 1.000€. Price: 932,9€

First we calculate the duration of each bond

Bond 1: 2,78 years.
Bond 2: 7,41 years.

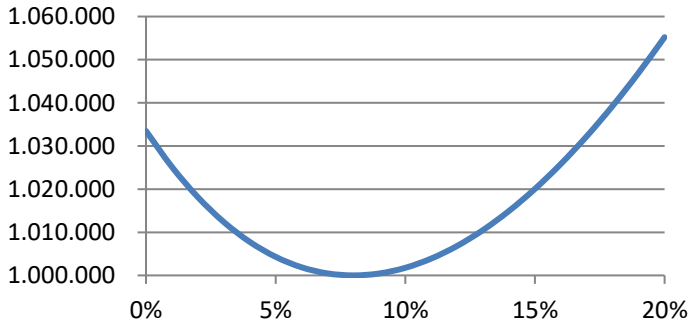
Then we calculate the proportion of each bond.

$w_1 + w_2 = 1$ $\quad w_1 = 1 - w_2 =$ **0,523**

$2{,}78w_1 + 7{,}41w_2 = 5$ $\quad w_2 = (5 - 2{,}78) / (7{,}41 - 2{,}78) =$ **0,478**

We will buy then:

355.051,74€ of bond 1 and
325.531,45€ of bond 2



	1	2	3	4	5	6	7	8	9	10
355.051,74	28.404,14	28.404,14	383.455,88							
325.531,45	24.423,58	24.423,58	24.423,58	24.423,58	24.423,58	24.423,58	24.423,58	24.423,58	24.423,58	373.331,89

The term structure of interest rates

The Yield Curve shows the relationship between return and time to maturity It is widely used to value financial assets.

The most widely used Yield Curve is the one built with public debt securities, given their:

- Risk-free characteristics
- Higher liquidity

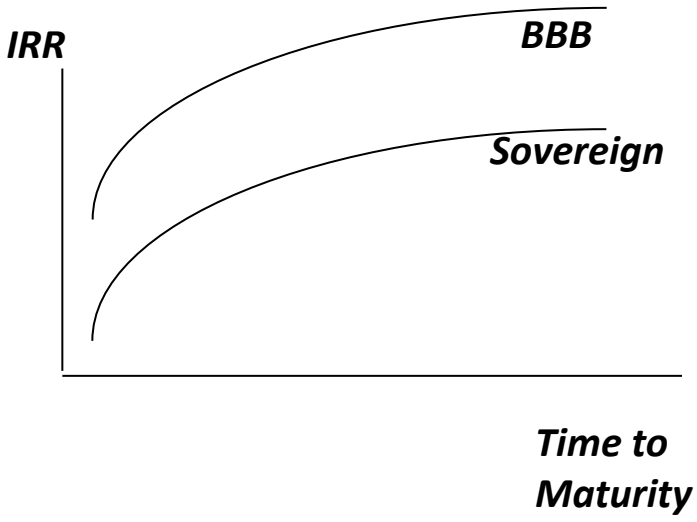
The most liquid and more frequently traded issues in the secondary market are used to build the curve.

The most usual shape of the Yield Curve is a growing curve.

The shorter terms are more volatile and more highly influenced by monetary policy decisions. Longer terms are more stable and influenced by economic expectations

Implicit interest rates are derived from the Yield Curve…

We have seen this before (lesson 4).
Just recap



The term structure of interest rates

Term implicit interest rates are derived from the Yield Curve

- **Spot interest rates:** rates currently required by investors
- **Term interest rate:** rate required for a certain time period in the future. Term rates can be derived from the Yield Curve

Prior to the calculation of implicit term rates, the zero-coupon curve must be obtained. The zero-coupon curve provides us with the spot rates necessary to obtain the term rates thereafter

- Every bond can be broken down into as many zero-coupon bonds as the number of coupons the bond has. A 10-yr €1,000 bond with 6% annual coupons can be broken down into nine €60 zero-coupon bonds and one €1,060 zero-coupon.

- Investing in a one-year bond at r_1 and then reinvesting at ${}_1r_2$ (the spot rate at time 1 on a bond maturing at time 2) yields the following Payoff: $(1+ r_1) * (1 + {}_1r_2)$
- Investing in a two-year bond at the two-year spot rate r_2 yields the following payoff: $(1 + r_2)^2$

The second way of investing can be reinterpreted as investing for 1 year at r_1 and for the second year at a forward rate f_2. f_2 is implicit in the two-year spot rate r_2

$$\mathbf{(1 + r_2)^2 = (1+ r_1) * (1 + f_2)}$$

Fixed income – The risk of default

A Risk-Free security is a fixed income asset with no credit risk, generally speaking a debt instrument issued by the State

Private debt instruments are riskier than public debt and therefore provide a higher return = Rf + spread. This spread will depend on the credit quality of each corporate

Rating agencies analyze debt issuers and issues and provide an opinion about their creditworthiness. There are short-term and long-term ratings

Promised bond yields usually go up as ratings go down.

Moody´s	S&Ps
Aaa	AAA
Aa2	AA
A2	A
Baa2	BBB
Baa3	BBB-
Ba1 and below	BB+ and below

} ***"Investment grade"***

Fixed Income–the risk of default (cont)

Company	Moody's Rating
Banco Santander	Baa1
Iberdrola	Baa1
BBVA	Baa2
Gas Natural	Baa2
Telefónica	Baa2
Repsol	Baa3
Bankinter	Ba1
Grifols	Ba2
Campofrío	B1
Codere	Caa3

March 2014

For the first time since 2010 Moody's upgraded the rating of the Kingdom of Spain to Baa2 on February 21st 2014.

This upgrade in the sovereign brought along a general improvement in the ratings of most Spanish corporates.

Fix Income – Passive Management

The duration as a measure of portfolio's risk - Limitations

- Duration only reflects interest rate risk… not other risks.
- TSIR is not flat, and its changes are not linear.
- Yield to maturity in short term bonds is more volatile… duration does not reflect this circumstance.
- Duration in stocks is harder to calculate.

Strategies for managing a bond portfolio

- Passive, or "buy and hold"
- Index matching, or "quasi passive"
- Immunization
- Dedicated and active

Fix Income – Passive Management

Bond Laddering

Portfolio is divided into equal parts and invested in laddered style maturities over the investor's time horizon.

Year	1	2	3	4	5	6	7
Principal	100	100	100	100	100	100	100
Coupon Income	5	5	5	5	5	5	5

Cash Flow Matching

	Irr	Today	1	2	3
Future cash flow needs			30.000,00	40.000,00	50.000,00
3 year bond A	10%	46.243,43 €	5.000,00	5.000,00	50.000,00
2 year bond B	10%	33.471,07 €	5.000,00	35.000,00	
1 year bond C	10%	18.181,82 €	20.000,00		
TOTAL		**97.896,32 €**			

Immunization

Fix Income – Active Management

General notions

1) How can we earn money with bonds if coupons prices don't change?
2) Bonds mispricing (**Relative-value investing**).
    - Also could be mispricing between EURIBOR – Yield curve, bond vs. bonds and because of Yield curve anomalies.
    - Strategy used by Long Term Capital Management.
    - Classic arbitrage
3) Maturity transformation. Working with bonds of different maturities and **time evolution**.
4) Differences between fixed incomes securities markets. **Risk premiums**.
5) Anticipation of interest rate evolution and dynamics (**Future predictions**).
6) Contingent immunization (conditional)
7) Working with swaps and derivates

Fix Income – Active Management

Interest risk rate: An opportunity

How do we measure interest risk rate exposure of a financial asset?

$$\textbf{Duration} = \frac{t_1 VA(C_1) + t_2 VA(C_2) + \cdots + t_6 VA(C_6)}{VA(C_1) + VA(C_2) + \cdots + VA(C_6)} \textbf{ (years)}$$

$$\textbf{Modified duration} = \frac{Duration}{1 + r} \textbf{ (\%)}$$

If interest rates growth 1%, price falls (Modified duration) %

$$\boldsymbol{P} = \sum_{k=1}^{T} \frac{C_k}{(1+r)^k}$$

$$\frac{\boldsymbol{dP}}{\boldsymbol{dr}} = -\frac{1}{1+r} \sum_{k=1}^{T} k \cdot \frac{C_k}{(1+r)^k}$$

$$\frac{\frac{\boldsymbol{dP}}{\boldsymbol{dr}}}{\boldsymbol{P}} = -\frac{1}{1+r} \frac{\sum_{k=1}^{T} k \cdot \frac{C_k}{(1+r)^k}}{\sum_{k=1}^{T} \frac{C_k}{(1+r)^k}} = -\frac{\boldsymbol{Duration}}{\boldsymbol{(1+r)}}$$

Convexity *is the second derivate. It tells how much the duration changes if interest rate changes.*

Fix Income – Active Management

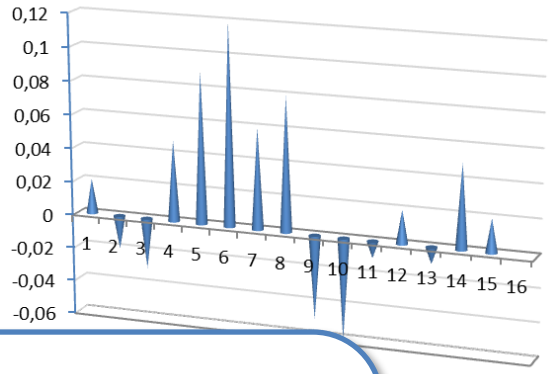
Active management strategy

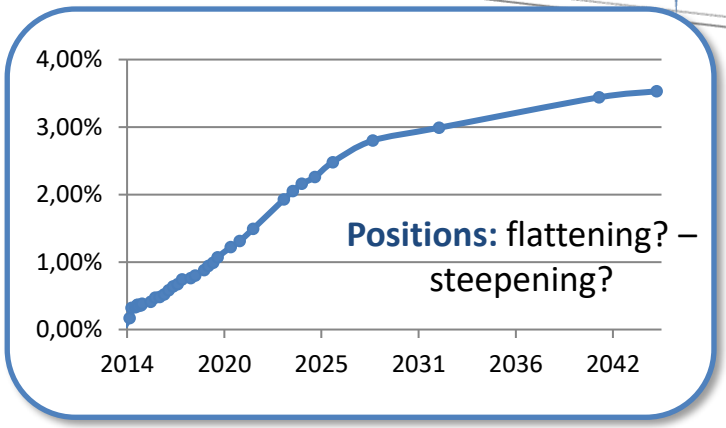
Duration
- General view interest rate direction
- Interest rate risk (direction)
- Position relative to the reference and risk (long, short or neutral)

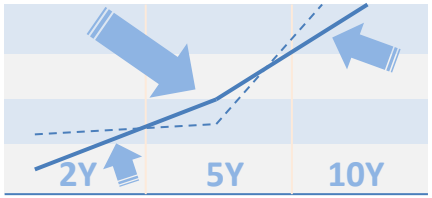
Term structure
- Relative value in each part of TSIR
- Non-parallel movements of TSIR
- TSIR – rate risk
- Positions or strategies

Credit analysis
- Direction of differences between credit risk from financial assets
- Default, downgrade and spreads extension

Selection and analysis
- Bond picking
- Buy “cheap” bonds and sell “expensive” ones.
- Analysis: error and performance valuation







Strategies:
In this case a short butterfly could be use. It combines several derivates contracts

Thanks