Chapter 1. Features of Debt Securities and Overview of Interest Rate Markets

- Monetary markets
- Bond definition and features
- Bond markets
- Specific types of bonds
- Size of sovereign debt markets

Definition of fixed income securities

- Fixed income security: Financial obligation of an entity that promises to pay a specific sum of money at a specified future date
  - Issuer or borrower: Entity that promises to make the payment
  - Lender or creditor: Entity that purchases this fixed income security
- Promised payments
  - Interests
  - Principal

Interest Rate Markets

- Last payment date: 0 to 1 year
  ⇒ Monetary market
- Last payment date: > 1 year
  ⇒ Bond markets
Section 1.

Monetary markets

A. Money-market instruments: Definition and categories

- Short-term debt instruments
- Maturity < 1 year
- Very sensitive to the Central Bank monetary policy
- Categories of issuers
  - Governments (federal & local levels)
  - Treasury bills (Bons du Trésor)
  - Banks
  - Certificates of deposit (Certificats de dépôt)
  - Bankers’ acceptance (Acceptation bancaire)
  - Corporations
  - Commercial paper (Billet de trésorerie)

B. The role of the Central Bank

- Triple status
  - Government’s banker
    - Finances budget deficit
  - Banks’ banker
    - Supervises & regulates the banking system
  - Nation’s banker
    - Conducts the monetary policy
- Steers the general level of interest rates
- 2 objectives
  - Stability of prices
  - Support of sustainable economic growth
B. The role of the Central Bank – cont’d

- Reserve requirements
- Key interest rates: 2 types
  - Overnight Central Bank funds interest rate
  - Fed Funds Rate in the US
  - Standing facilities in the Euro zone
    - Marginal lending facility
    - Deposit facility
  - Unsecured overnight call rate in Japan
  - Repo rate (Open-market operations)
    - Federal Discount Rate in the US
    - Main refinancing rate in the Euro zone

Key interest rates affect a whole spectrum of interest rates
- Inter-bank lending rates
- Rates that commercial banks set for their customers
- Rates at which short-term debt instruments are issued

C. Common features of money-market instruments

- One cash-flow paid at maturity
- Interests paid in advance (usually)
  - Simple interest (Intérêt simple)
  - Straight-line rate (taux proportionnel)
  - Day count convention: actual/360
    - (365 for the UK, Ireland, NZ, Australia)
- Quoted with an annualized interest rate instead of a price
  - Either on a discount rate basis (taux d’escompte)
  - Or money-market rate basis (taux in fine)

C. Common features of money-market instruments – cont’d

- Discount rate (taux d’escompte) denoted $e$
  \[ \text{Price} = \text{Principal} \times \left( 1 - \frac{n}{360} \times e \right) \]
- Money-market rate (taux in fine) denoted $i$
  \[ \text{Price} = \left( \frac{\text{Principal}}{1 + \frac{n}{360} \times i} \right) \]

$n =$ actual number of days between settlement date (date de règlement-livraison) and maturity date
Example 1

- A money-market instrument is quoted on a *money-market rate* basis:
  - Principal = $10,000
  - Trade date = October 1
  - Settlement date = October 2
  - Maturity date = December 31
  - Quote = 8%
- What is the price of that instrument?
  - \# of days between Oct. 2 and Dec. 31 = (31-2) + 30 + 31 = 90
  - \[ \text{Price} = \frac{10,000}{1 + \frac{90}{360} \times 8\%} = $9,908.92 \]

Example 2

- A money-market instrument is quoted on a *discount rate* basis:
  - Principal = $10,000
  - Trade date = October 1
  - Settlement date = October 2
  - Maturity date = December 31
  - Quote = 8%
- What is the price of that instrument?
  - \# of days between Oct. 2 and Dec. 31 = (31-2) + 30 + 31 = 90
  - \[ \text{Price} = 10,000 \left(1 - \frac{90}{360} \times 8\% \right) = $9,800.00 \]

D. Treasury money-market instruments

- 1. US T-bills
  - Features
    - Maturity: Less than or equal to 1 year (4, 13, 26, or 52 weeks)
    - Minimum par value: $100 since 7 April 2008 ($1,000 before)
    - Maximum par value: $5 million
    - Issued through auctions
    - Bids: Discount straight-line rate
    - Weekly except for 52-week T-bills (monthly)
    - Trading after issuance
    - Discount rate / settlement: D+1
2. French BTFs

- Negotiable fixed-rate discount Treasury bills
  (*Bons du Trésor à taux Fixe*)
  - Features
    - Maturity: Less than or equal to 1 year (5, 13, or 26 weeks)
    - Par value/security: €1
  - Issued by auctions
    - Bids: Discount straight-line rate
    - Each Monday
  - Trading after issuance
    - Money market straight-line rate/ settlement: D+1

3. German Bubills

- Treasury discount paper (Bubills)
  - Features
    - Maturity: 3, 6, 9, & 12 months (since 2009)
    - Minimum par value (since January 2004): €0.01
  - Issued by auctions
    - Each Monday for 6-month bills
    - On a monthly basis on Mondays for 12-month bills
    - Ad hoc issues of 3-month and 9-month Bubills in 2009

Practice question 1

- A trader purchases BTFs at their issuance (primary market) and sells 14 days later (secondary market).
  - Purchase conditions in the primary market (Issue)
    - Par value: €1,000,000
    - Maturity: 182 days
    - Discount rate: 6.50%
  - Sale conditions in the secondary market (14 days later)
    - Money-market rate: 6.20%
  - 1) What is the amount paid by the trader to buy the BTFs?
  - 2) For what amount does the trader sell the securities?
  - 3) Determine the annualized return on this transaction:
    - a) by using the conventions of the monetary market.
    - b) by calculating an annual equivalent yield.
Practice question 1 – cont’d

1. Certificates of Deposit (Certificats de dépôt)
   - Promissory note issued by a bank
   - Maturities:
     - 1 month to 5 years (U.S)
     - 1 day to 1 year (Europe)
     - Most frequent maturities from a few weeks to 3 months
   - Final cash flow = Principal + Interests
     (interests paid in arrears)
     - \( i_0 \) = interest rate at issuance
     - \( t \) = maturity in # of days
     - Final cash flow = \( \text{Principal} \left( 1 + \frac{1}{360} \times i_0 \right) \)
1. Certificates of deposits – cont’d

- At issuance, price = principal
- In the secondary market, quote = money-market rate denoted $i$

$$\text{Price} = \frac{\text{Principal} \left[ 1 + \frac{1}{360} \times i \times 360 \right]}{\left[ 1 + \frac{n}{360} \times i \right]}$$

where $n$ is the remaining maturity in # of days

- Negotiable CD / Non-negotiable CD
- Eurodollar CD

2. Bankers’ acceptances

- Letter of credit issued by a bank to guarantee the payment of a trade transaction (generally foreign trade)
- Typical scheme:
  - An importer commits to pay the goods imported on the date set by the manufacturer (maturity date).
  - The importer’s bank guarantees the payment by issuing a banker’s acceptance
  - Agrees to pay to the holder of the acceptance the face value of the transaction at maturity.
- Traded:
  - On a discount basis in the US
  - On a money-market basis in Europe

Example 3

- On 27 July N, Bank A issues a CD maturing on 29 April N+1 for a principal amount of €80 million. The interest rate at issuance is 4.27%.
- The money-market rate of the CD on 13 August N is 4.19%.
- Calculate the price of the CD:

$$\text{Price} = \frac{€80M \left[ 1 + \frac{276}{360} \times 4.27\% \right]}{\left[ 1 + \frac{259}{360} \times 4.19\% \right]} = €80,201,287.79, \text{ that is } 100.25\% \text{ of face value}$$
Example 4

- On 14 December N, an investor buys a US banker’s acceptance maturing on 10 April N+1, with a discount rate of 1.90% for a face value of $30 million.
- Market price of this banker’s acceptance:
  \[
  30M \left( 1 - \frac{117}{360} \times 1.90\% \right) = $29,814,750
  \]
- In Europe, a banker’s acceptance with a rate of 1.90% would be priced:
  \[
  \frac{\text{€30,000,000}}{1 + \frac{117}{360} \times 1.90\%} = \text{€29,815,886.90}
  \]

F. Commercial papers
(Billets de trésorerie)

- Short-term unsecured promissory note issued by a non-banking firm
  - One final cash flow = Principal
  - Maturity: 50 days or less (U.S),
    - 1 day to 2 years (Europe)
  - Roll-over short term paper
  - Sold on a discounted money-market basis
- Trade price = \[
  \frac{\text{Principal}}{1 + \frac{n}{360} \times i}
  \]
A. Definition of bonds

- Long-term fixed income security
  - Maturing in more than 1 year
- Promised payments
  - Interests
  - Principal

B. Features: Indenture

- Bond’s indenture: Promises of the issuer and the rights of the bondholders
- As part of the indenture, there are affirmative and negative covenants
  - Affirmative covenants: Activities that the borrower promises to do
  - Negative covenants: Restriction on the borrower’s activities

B. Features: Par value, issue price, & redemption value

- Par value / Face value / Nominal value (valeur faciale, valeur nominale)
  - Amount borrowed by the issuer, used to compute the interests
- Issue price (prix d’émission)
  - Amount paid to buy the security when first sold
    - At par value
    - At a discount
- Redemption value: Amount redeemed by the issuer prior to or at the maturity date (valeur de remboursement)
  - At par value
  - At a premium
B. Features: Coupon rate & frequency

- Coupon rate: Interest rate that the issuer agrees to pay each year
- Coupon frequency
  - annually, semi-annually, quarterly, etc.
- Coupon: Periodic amount of the interest payment made to bondholders
  - Coupon = Coupon rate x Par value (for annual coupons)

Example 5

- Maturity: 1 December 2020
- Coupon rate: 8%
  - US quotation: 8s of 12/1/2020
  - French quotation: 8% 12-20
- Par value: €1,000
- Coupon = 0.08 x 1,000 = €80

B. Features: Provisions for paying off bonds

- Bullet repayment (Remboursement in fine) = Redemption at maturity (bullet maturity)
- Amortizing bonds
  - Redemption in equal slices (or series), or constant amortization (Remboursement par séries égales)
  - Redemption in fixed instalments (par annuités constantes)
  - Not used any more
B. Features: Payment dates and maturity

- Issue date (date d’émission)
- Accrue date (date de jouissance)
- Coupon dates (dates de détachement de coupon)
- Redemption date (date de remboursement)
- Term to maturity (maturité):
  Number of years the debt is outstanding
  (remaining until redemption date)

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Example 6 – No redemption premium

EDF

- Par value = €1,000
- Coupon rate = 4.5%
- Issue price: At par
- Issue date: 17 July 2009
- Accrue date: 17 July 2009
- Bullet repayment
- Redemption date: 17 July 2014
- Redemption at par
- Coupon frequency: annual, every 17 July
Example 7 – With redemption premium

UBISOFT

- Issue date: 30 November 2001
- Coupon rate: 2.5%
- Par value: €47.50 (100%)
- Redemption price: €52.70
- Redemption date: 30 November 2006
- Maturity: 5 years

C. Yield (taux de rendement)

- Discount rate (taux d'actualisation) that makes the discounted value of the security’s cash flows equal to its price
  \[ \Rightarrow \text{IRR of an investment} \]
- EDF bond’s yield at issue = \( y_{\text{edf}} \) such that
  \[
  \sum_{t=1}^{5} \left( \frac{45}{1 + y_{\text{edf}}} \right) = \frac{1000}{1 + y_{\text{edf}}} \Rightarrow y_{\text{edf}} = 4.5\%
  \]
- Ubisoft bond’s yield at issue = \( y_{\text{ubisoft}} \) such that
  \[
  \sum_{t=1}^{5} \left( \frac{47.5 \times 2.5\%}{1 + y_{\text{ubisoft}}} \right) = \frac{52.7}{1 + y_{\text{ubisoft}}} \Rightarrow y_{\text{ubisoft}} = 4.5010\%
  \]

D. Trade and quotation rules

- Transaction date (date de négociation)
  Date on which a transaction is initiated = D
- Settlement date (date de règlement)
  Date when the transaction is cleared by the delivery of the securities by the seller to the buyer and the payment of funds from the buyer to the seller = D + 1, 2, or 3
D. Trade and quotation rules – cont’d

\[ t=0 \quad t=1 \quad t=2 \quad t=T \]

- Issue date
- Accrue date
- Coupon date
- Transaction date
- Settlement date
- D+1, D+2, or D+3

D. Quotation rules

- Bond’s price: Percentage of the par value
  - Example
    - Par value: € 500
    - Quote: 102%
    - Price: € 510
  - Bond trades below its par value: Trading at a discount
  - Bond trades above its par value: Trading at a premium

D. Quotation rules – cont’d

- Quotation form
  - Decimal (Europe)
  - Fractional (U.S.)
- Fractional: Points are split into units of 1/32
  - Price of 98-14 refers to: 98\( \frac{14}{32} \) or 98.4375% of par value
  - Thirty-seconds are split by the addition of a plus sign or a number
    - = Plus sign \(-\): Half a thirty-second (1/64) is added to the price
    - Price of 98\( \frac{14}{32} \) refers to: 98\( \frac{14}{32} \) or 98.453125%
    - = Number \(+\): Number of eighths of thirty-seconds (or 256ths) are added to the price
    - Price of 98\( \frac{14}{32} \) refers to: 98\( \frac{14}{32} \) or 98.4453125%
Example 8

1) Par value: €1,000 – Price: €950
   Price quote: 95%

2) Par value: €100 – Price: €101.25
   Quotation in fractional form (US): 101\(\frac{1}{32}\)
   Quotation in decimal form (Europe): 101.25

Example 9

Quotation rules in the US

<table>
<thead>
<tr>
<th>Quoted price</th>
<th>Price per $1 of par value</th>
<th>Par value</th>
<th>Dollar price</th>
</tr>
</thead>
<tbody>
<tr>
<td>90(\frac{3}{8})</td>
<td>0.9050</td>
<td>$1,000</td>
<td>905.00</td>
</tr>
<tr>
<td>102(\frac{1}{4})</td>
<td>1.0275</td>
<td>$5,000</td>
<td>5,137.50</td>
</tr>
<tr>
<td>70(\frac{1}{8})</td>
<td>0.7063</td>
<td>$10,000</td>
<td>7,062.50</td>
</tr>
<tr>
<td>113(\frac{11}{32})</td>
<td>1.1334</td>
<td>$100,000</td>
<td>113,343.75</td>
</tr>
</tbody>
</table>

Practice question 2

- Given the information in the first and third columns for a US investor, complete the information in the second and fourth columns.

<table>
<thead>
<tr>
<th>Quoted price</th>
<th>Price per $1 of Par value</th>
<th>Par value</th>
<th>Dollar price</th>
</tr>
</thead>
<tbody>
<tr>
<td>102(\frac{1}{4})</td>
<td></td>
<td>$1,000</td>
<td></td>
</tr>
<tr>
<td>50(\frac{1}{8})</td>
<td></td>
<td>$5,000</td>
<td></td>
</tr>
<tr>
<td>92(\frac{5}{16})</td>
<td></td>
<td>$10,000</td>
<td></td>
</tr>
<tr>
<td>121(\frac{3}{32})</td>
<td></td>
<td>$100,000</td>
<td></td>
</tr>
</tbody>
</table>
Practice question 2 (Answer)

D. Quotation rules: Accrued interest

- **Accrued interest**: Amount of interest earned on a bond since the last coupon payment date
- **Quoted in % of par value**

<table>
<thead>
<tr>
<th>Accrued interest</th>
<th>Last coupon payment date</th>
<th>Settlement date</th>
<th>Next coupon payment date</th>
</tr>
</thead>
</table>

- **Cum-coupon**: Bond trading with coupon
- **Ex-coupon**: Bond trading without coupon
- **Full price (prix plein coupon)**: Cum-coupon bond price
- **Clean price (prix pied de coupon)**: Full price – Accrued interest (quoted in % of par value)

Example 10

Par value: €1,000
Clean price: €900
Accrued coupon: €50
Price quote: 90%
Coupon quote: 5%
Full price = €950
## Example 11

- EDF 4.5% July 2014
- Transaction date: 6 August 2009
- Settlement date: 11 August 2009
- Coupon rate: 4.5%
- Clean price = 104.01%
- Accrued interest = 0.307%
- Full price = 104.01% + 0.307% = 104.317%

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## Section 3.

### Main Bond Markets

- **U.S. Treasury securities**
  - (1) Fixed-principal securities
    - Treasury notes
    - Treasury bonds
      - Semi-annual coupon
      - Settlement: D+1
      - Par value: $100 ($1,000 in the past)
A. Standard sovereign bonds (France)

- **OATs**: French government’s long-term Treasury bonds
  - **Features**
    - Maturity: 7 to 50 years
    - Par value/security: €1
    - Long-dated OAT can be stripped
  - **Auction**
    - Bids: Submitted at the clean price (% of par value)
    - First Thursday of each month
    - Settlement date: 25th of the month
  - **Trading**
    - % of par value net of accrued interest / settlement: D+3

A. Standard sovereign bonds (France)

- **BTANs**: Negotiable fixed-rate medium-term Treasury notes
  - **Features**
    - Maturity: 2 or 5 years
    - Par value/security: €1
  - **Auctions**
    - Bids: Submitted at the clean price (% of par value)
    - Third Thursday of each month
    - Settlement date: 5th of the following month for 2-year BTAN
    - 12th of the following month for 5-year BTAN
  - **Trading**
    - % of par value net of accrued interest / settlement: D+1

A. Standard sovereign bonds (Germany)

- **Federal bonds (Bunds)**
  - Maturity: 10 to 30 years
  - Minimum nominal amount: €0.01
- **Federal Treasury notes**
  - Maturity: 2 years
- **Federal Treasury financing paper**
  - Maturity: 12 to 24 months
A. Standard sovereign bonds (UK)

- Gilt-edged security: UK Government liability
  - Conventional gilts
    - Maturity: 5, 10, 30, and 50 years
    - Short gilts (0-7 years)
    - Medium gilts (8-15 years)
    - Long gilts (>15 years)
  - Nominal: £100
  - Semi-annual coupon
  - Settlement: D+1
  - Example: 4% Treasury Gilt 2016

B. Corporate debt securities

- Secured debt: Real property or personal property may be pledged as security
  - Mortgage debt: Allows the issuer to grant the bondholder a lien against pledged assets (hypothèque)
  - Collateral trust bonds: Bonds secured by stocks, notes, bonds etc. (nantissement)

B. Corporate debt securities

- Unsecured debt (dette sans sûreté): Not secured by a specific pledge of property
  - Debenture bondholders
  - Protective provision
  - Ranking:
    1. Secured debt (dette avec sûreté)
    2. Debenture bonds (dette obligataire)
      - Senior
      - Junior
    3. General creditors (créanciers divers)
    4. Subordinated debenture bonds (dettes subordonnées)
C. Primary and secondary market

- Primary market
  - Distribution of bonds at issue
    - Discovery of the bond’s offer price
    - Bond allocation

- Secondary market
  - Trading of bonds after issue until maturity
    - Discovery of the bond’s trade price
    - Liquidity and regular information

1. Primary market techniques

- Dutch auction (Adjudication ou enchère à la hollandaise)
  - Issuer announces issue terms / maximum sell price
  - Financial institutions submit bids in descending order
    - Single-price auction (Adjudication à la française)
    - Multiple-price auction (Adjudication à prix demandé)
  - Sovereign bonds

- Syndicate transaction (Syndication)
  - Underwriting syndicate (Syndicat bancaire)
  - Corporate bonds
  - Selling techniques
    - Competitive bidding (Appel d’offres)
    - Book-building (Construction d’un livre d’ordres)

- Private placement (Placement privé)

a. Distribution of new government bonds through auctions

- When to organize the auction?
  - Regular auction cycles
    - OAT: every month, 1st Thursday at 10:50 am
    - BTAN: every month, 3rd Thursday, at 10:50 am
    - BTF: every Monday at 2:00 pm
  - Ad hoc auction method
    - Auctions announced during favorable market conditions

- Determination of issue characteristics
  - Original issuance
  - Tap method (Assimilation)
  - Additional bonds of a previously outstanding bond issue
  - Same coupon, same payment dates, same maturity...
  - Fungibility
a. Distribution of new government bonds through auctions

- **Price determination method in a Dutch auction**
  - **Single-price method**
    - Issuer announces a maximum selling price
    - Investors submit bids in descending order of price (ascending order of yield)
    - Highest price (lowest yield) that clears the offer and/or acceptable for the issuer
    - Winning bidders are allocated securities at this price (yield)
  - **Multiple-price method**
    - Winning bidders are allocated securities at the yield they bid
    - OAT: *Adjudication à prix demandé*
    bids submitted by SVT (*Spécialistes en Valeurs du Trésor*)

Auction – Example 12

- **US 10-year notes**
  - Issuer: US Treasury Department through Fed. of NY
  - Bidders: primary dealers
  - System: ‘TRAPS’ (Trading Room Automated Processing System)
  - Amount offered: $10 billion
  - Coupon rate = 5.125%

- **Bids**
  - $1.00 billion at 5.115%
  - $2.50 billion at 5.120%
  - $3.50 billion at 5.125%
  - $4.50 billion at 5.130%
  - $3.75 billion at 5.135%
  - $2.75 billion at 5.140%
  - $1.50 billion at 5.145%

### Single-price auction

<table>
<thead>
<tr>
<th>Yield</th>
<th>Cumulated amount</th>
<th>Offer</th>
<th>Clearing yield</th>
<th>Allotments</th>
<th>Executed at</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.115%</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td>5.130%</td>
<td></td>
</tr>
<tr>
<td>5.120%</td>
<td>3.50</td>
<td>2.00</td>
<td>2.50</td>
<td>5.130%</td>
<td></td>
</tr>
<tr>
<td>5.125%</td>
<td>7.00</td>
<td>3.50</td>
<td>3.50</td>
<td>5.130%</td>
<td></td>
</tr>
<tr>
<td>5.130%</td>
<td>11.50</td>
<td>5.130%</td>
<td>3.00</td>
<td>5.130%</td>
<td></td>
</tr>
<tr>
<td>5.135%</td>
<td>15.25</td>
<td></td>
<td>0.00</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>5.140%</td>
<td>18.00</td>
<td></td>
<td>0.00</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>5.145%</td>
<td>19.50</td>
<td>10.00</td>
<td>0.00</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

**Bid-to-cover ratio = 19.5/10 = 1.95**

*Ratio de couverture de la demande*
Multiple-price auction

Bid-to-cover ratio = 19.5/10 = 1.95

Example 13

- OAT 3.25% 25 April 2016
- Auction of 6 July 2006
  - Issuer: Trésor français par l’intermédiaire de l’Agence France Trésor
  - Bidders: SVT
  - Total bid amount: EUR 5,230,000,000
  - Highest bid price: 93.01%
  - Lowest bid price: 92.77%
  - Lowest price accepted: 92.98%
  - Allocated submissions: EUR 2,363,000,000
  - Non-allocated submissions: EUR 2,867,000,000
  - % allocated at limit price: 50% (EUR 168,000,000)
  - Weighted average price (yield): 93% (4.13255%)

b. Distribution of new corporate bonds

- Underwriting syndicate (Syndicat bancaire)
  - Lead underwriters (chefs de file)
  - Preparation / Execution / Syndicate choice
  - Joint-lead underwriters (chefs de file associés)
  - Preparation / Execution
  - Co-lead (co-chefs de file)
  - Placement / guarantee of a substantial portion of the issue
  - Co-managers
  - Placement / guarantee of a small portion of the issue
- Syndicate role
  - Advising the issuer on the terms and the timing of the offering
  - Preparing documents and prospectus / Due diligence
  - Informing potential investors / Marketing the issue
  - Distributing the securities (price and security allocation)
**Selling methods**

- **Competitive bidding** (*Appel d’offres*)
  - Call for bids to financial institutions
  - Best bidding underwriter or underwriting syndicate
  - **Bought deal** (*Prise ferme*), 1 day to accept or reject the bid
  - For low-risk bonds: government-owned companies, frequent issuers
- **Book-building** (*Livre d’ordres*)
  - 1 lead underwriter
  - Book-runner (*arrangeur*): run an order book
  - Roadshows, one on one
  - Sets the price range for the offer
  - Receives purchase orders in the order book
  - Sets the final price according to submissions / serves orders

**Book-building**

- Choice of the lead underwriter(s)
- Price range
- Order submissions in the order book
- Settlement
- Document preparation
- Due diligence
- Roadshows
  - One on one
  - Preliminary prospectus
- 1st week
- 2nd week
- 3-2 weeks

**Placement guarantees**

- Firm commitment (*Garantie de bonne fin*)
  - Underwriters buy unsubscribed bonds (‘sticky’)
- Best-efforts contract (*sans garantie*)
c. Recent Treasury issues by book-building – Example

- OAT 25 April 2060 4%
  - Issued on 10 March 2010 with an underwriting syndicate
  - Minimum amount to be issued: 3 billion euros
  - 5 billion euros issued
  - 8.3 billion euros of bids accumulated in the book: bid-to-cover ratio = 8.3/3 = 2.77
  - Clearing yield: 4.175%
  - Allocation
    - 37% to asset managers, 19% to banks, 30% to pension funds, 9% to insurance companies, 3% to hedge funds
    - The Netherlands 26%, the UK 21%, North-America 18%, France 10%

2. Secondary market organization

- Electronic Trading systems
- Dealer-to-Customer system (OTC)
- Exchange system
  - Electronic order book (Regulated)
  - Single dealer system
  - Multiple dealer system
  - Continuous trading
  - Call auctions

Dealer-to-customer system

- Continuous quotes
- Execution of customers' orders
- BID - ASK
  - A: 98.25-98.27
  - B: 98.24-98.26
  - C: 98.24-98.27
Exchange system
– electronic order book

Order book

→ Limit orders
→ Market orders

Continuous matching or fixing (call auctions)

Exchange system
– electronic order book

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Interdealer trading systems

- In Europe: MTS
- European sovereign securities
  - 14 national trading platforms
    - Austria
    - Belgium
    - Denmark
    - Finland
    - France
    - Germany
    - Greece
    - Ireland
    - Israel
    - Italy
    - Netherlands
    - Portugal
    - Slovenia
    - Spain
- 1 pan-European trading platform: EuroMTS
MTS

- Introduced in Italy in 1988 to develop secondary market in Italian government bonds
- Reformed in 1994 => today’s structure
  Privatized in 1997
  EuroMTS created in 1999
- Pure interdealer platform with competitive market makers
  - M-M obligations: 2-way prices
    - for at least 5 hours a day
    - for a minimum quantity
  - Works as a limit order book
  - Firm quotes
  - Traders can hit quotes

MTS - Example

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MTS members
MTS members – cont’d

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D. Domestic and international markets

Overview of the sectors of the bond market

- Domestic Bond Market
- External Bond Market (Eurobond Market)

Eurobonds

- Bonds issued directly in the international (external) market
- International underwriting syndicate

**Example 14. BNP Paribas 4.5% 2011**
- 3-year bond issued and redeemed at par
- Coupon rate = 4.5%
- Issued in several European countries at the same time
- International underwriting syndicate:
  - BNP Paribas UK Limited (chef de file), BayernLB, CortaL Consors, Danske Bank, Dresdner Kleinwort, DZ Bank AG, Fortis Bank, ING, KBC Bank NV, Landesbank Baden-Württemberg, Landesbank Berlin AG, Rabobank Nederland et RZB Austria, Raiffeisen Zentralbank Österreich AG
- After issue, listed on: Euronext Amsterdam, Euronext Paris, Frankfurt SE, Luxembourg SE & Vienna SE
Section 4.
Specific types of bonds

A. Deferred-coupon bonds

- Bonds that let the issuer avoid using cash to make interest payments for a specified number of years
  - Deferred-interest bonds
  - Step-up bonds
  - Payment-in-kind bonds (unusual)

1. Deferred-interest bonds

- Interest payments are deferred for a specific number of years
  - Higher interest payments after the deferred period

Deferred period
Periodic interest payments
2. Step-up notes or bonds

- Coupon rate increases over time
  - Single step-up note: Only one change
  - Multiple step-up note: More than one change

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B. Zero-coupon bonds

- Zero-coupon bonds: No periodic coupon
  - Bought substantially below the par value
  - Interest: Par value – Bond’s price
    - Example:
      - Price: $70
      - Par value: $100
      - Interest = $100 – $70 = $30

Treasury strips

- Created from outstanding coupon Treasuries by the private sector
- In the U.S.
  - Treasury's Separate Trading of Registered Interest and Principal Securities (STRIPS)
- In France
  - OAT strips (OAT démembrées)
Example 15

- Treasury STRIPs
  - $100 million of a Treasury note
  - Maturity: 10-year
  - Coupon rate: 10%
  - Process: Create zero-coupon Treasury securities
  - 20 semi-annual payments: $5 Million ($100M x 10% / 2) +
  - Repayment: $100 Million
  - Issue at a discount of a receipt representing a single payment claim on each payment creating 21 zero-coupon instruments

Example 15 – cont’d

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Example 16

- 25/04/13 OAT STRIPS

  Date: 17/06/05
  Price: €0.7822
  Par value: €1
  Number of securities: 10,000

  Capital gain = 10,000 x (€1 – €0.7822) = €2,178
C. Indexed bonds

Indexed bonds have coupons depending on:
- Commodity
- Foreign exchange rate
- Return equity index
- Inflation index

In the U.S.
- Treasury Inflation Protection Securities (TIPS)

In France
- Inflation-indexed OATs
  - OAT/c; OAT/i€
  - Post-set rate (taux post-déterminé)
  - Indexation coefficient

In the U.K.
- Index-linked gilts
  - Cash flows adjusted to the General Index of Retail Prices (RPI)
  - Example: 1½% I-L Treasury Gilt 2017

Example 17

Inflation-indexed Treasuries purchased on 1st January
Annual coupon rate: 3.5%
Principal: $100,000
Annual inflation rate:
- 3% from 1st January to 1st July
- 2% from 1st July to 31st December

Inflation-adjusted principal ($\text{P}_{\text{ind}}$) & coupon ($\text{C}_{\text{ind}}$):
- 1st July: $\text{P}_{\text{ind}} = 100,000 \times (1 + 3\% / 2) = \$101,500$
  $\text{C}_{\text{ind}} = 101,500 \times (3.5\% / 2) = \$1,776.25$
- 31st December: $\text{P}_{\text{ind}} = 101,500 \times (1 + 2\% / 2) = \$102,515$
  $\text{C}_{\text{ind}} = 102,515 \times (3.5\% / 2) = \$1,794.01$
Example 18

Date: 25/04/06
Number of securities: 10,000
Indexation coefficient: 1.05455
Real coupon: 3%

Paid coupon = 3% x 10,000 x 1.05455 = €316.37

D. Floating-Rate Securities

- Reference rate: Interest rate or interest rate index
- Floating-rate securities: Periodical reset coupon payments
  - Coupon rate = Reference rate + quoted margin

Usual short-term references

- Libor (London Inter-Bank Offer Rate)
  Average of interest rates at which banks are prepared to
  make deposits with other banks
  - Deposit with a bank = Loan
  - EX: 1-month Libor (rate at which 1-month deposits are offered)
  - Libor trades in the Eurocurrency market
    - EX: 3-month USD Libor / 6-month EUR Libor
  - Published daily by the BBA at 11h GMT
  - USD, GBP, JPY, CHF, CAD, AUD, DKK, NZD, EUR
  - Mat.: O/N, T/N, S/N, 1W, 2W, 3W, 1M to 12M

- Euribor (Euro Inter-Bank Offer Rate)
  same for banks of the Euro zone on Euro deposits
  - Published by the FEB (Federation of European Banks)
**Coupon rate determination**

- Quoted margin: Amount added/subtracted to the reference rate
  - Example 1: Coupon rate = 1-month LIBOR + 100 bp
    1-month LIBOR: 5% on the coupon reset date
    Coupon rate = 5% + 1% = 6%
  - Example 2: Coupon rate = 5-year Treasury yield – 90 bp
    5-year Treasury yield: 7% on the coupon reset date
    Coupon rate = 7% - 0.9% = 6.1%

**Sovereign floaters (France)**

- Floating-rate OATs
  - **TEC 10 OAT**
    - TEC 10 = 10-year constant maturity rate
      (Taux d’Échéance Constante à 10 ans)
    - Calculated every day from the yields of the 2 OATs which maturities are the closest to 10 years (interpolation)
    - Pre-set revisable rate (taux pré-déterminé)
    - Coupon frequency: quarterly

---

**10-year constant maturity rate (TEC10)**

![Graph showing 10-year constant maturity rate (TEC10)](chart.png)
Example 19

- 25/01/09 TEC 10 OAT
- Coupon dates: 25/01, 25/04, 25/07, 25/10
  
  \[ \text{Coupon} = \left[1 + \text{TEC} + M^{1/4} - 1\right] \times \text{Nom} \]
  
  Reference rate: TEC 10 observed on 18/01/05 = 3.56%
  M (nominal margin): -1%
  Nom (nominal amount per security): €1
  Coupon paid on 25/04/05
  
  \[ \text{Coupon} = \left[1 + 3.56\% - 1\right]^{1/4} - 1 \times €1 = 0.006339 \]

Inverse floaters

- Coupon rate moves in the opposite direction from the change in the reference rate
  
  - Coupon formula: \( K - L \times \text{(reference rate)} \)
    
    - Coupon rate increases when the reference rate decreases
    - Coupon rate decreases when the reference rate increases

Example 20

- \( K = 20\% \), \( L = 2 \)
- Reference rate: 3-month Treasury bill rate
- 3-month T-bill = 6% at the coupon reset date
  
  \[ \text{Coupon rate} = 20\% - 2 \times (6\%) = 8\% \]
  
  3-month T-bill = 5% at the coupon reset date
  
  \[ \text{Coupon rate} = 20\% - 2 \times (5\%) = 10\% \]
E. MTN : Medium-term notes
- Notes sold to investors in small amounts on a continuous basis
- MTN programme = series of issues over time
- Maturity ranges: 9-12 months, 12-18 months, 18-24 months, etc up to 30 years
- Total amount = €100M to €1BN
- Fixed or floating rate
- Generally
  - Unsecured / Senior debt
  - Private placement on a best-effort basis

F. Convertible and Exchangeable bonds
- Convertible bond: The right for bondholders to convert the bond for a specified number of shares of common stock
- Exchangeable bond: The right for bondholders to exchange the issue for a specified number of shares of common stock of a corporation different from the issuer of the bond

Example 21
- Convertible bond issue
  - Club Méditerranée, November 2004, €150M
  - Nominal value: €48.5
  - Issue date: 1 November 2004
  - Redemption date: 1 November 2010
  - Coupon rate: 4.375%
  - Redemption value = par value
  - Conversion ratio: 1 share for 1 bond
  - Conversion period: 3 Nov. 2004 to 7th business day preceding the redemption date
  - Share price at issuance: €36.62
Example 22

- Exchangeable bond issue
  - 14 October 2009
  - Artemis: 4.10% stake in Vinci
  - €300M issue
  - Issue price = €51.12
  - (30% premium / Vinci stock price €32.39)
  - Maturity date: 1 January 2015
  - Coupon rate = 4.25%, semi-annual payments (1 Jan., 1 Jul.)
  - If all bonds are exchanged, participation reduction of 1.13% in Vinci shareholdings (~5.9 million shares)
  - Lead underwriters: BNP Paribas and Calyon
  - Listed at the Luxembourg Exchange

G. Asset-Backed Securities

(Obligations adossées)

Securitization (Titrisation)

Financial institution

- Residential mortgage loans
- Commercial mortgage loans
- Corporate loans
- Bonds
- Automobile loans
- Student loans
- Credit card receivables
- Other receivables

Mortgage-backed securities
- pass-through
- interest-only tranches
- principal-only tranches
- floaters / inverse floaters
- step-up notes

Credit enhancement

Institution or Special Purpose Vehicle (SPV)

Investors

- Sell securities
- Cash

H. Embedded options

- Embedded options granted to issuers
  1. Right to call the issue / Right to prepay principal
     (Option de remboursement anticipé au gré de l'émetteur)
  2. Cap on a floater (Taux plafond)

- Embedded options granted to bondholders
  3. Conversion privilege (Option de conversion)
  4. Right to put the issue
     (Option de remboursement anticipé au gré du prêteur)
  5. Floor on a floater (Taux plancher)
Call and put provisions

- Call provision: Right of the issuer to retire the issue at a specified price prior to maturity date
- Put provision: Right for bondholders to sell the issue back to the issuer at a specified price on designated dates

1. Call provision

- Right of the issuer to retire the issue at a specified price prior to maturity date
  - Callable bond
  - Call price
  - First call date
  - Certificates to be called:
    - Selected randomly (bonds issued through a public offer)
    - Pro rata basis (bonds issued through a private placement)

1. Call provision – cont’d

- Call price can be:
  - Fixed regardless of the call date
  - Based on a specified price in the call schedule
  - Based on a make-whole premium provision
    (clause de maintien de rendement)
Example 23

- Fixed regardless of the call date
- $250 million Anheuser-Busch 7.1% issue
- Issued on 6/10/1997 and due on 15/6/2007
- Deferred call: 7 years
- First call date: June 15th 2004
- Call price: Par + accrued interest
- Redeemable:
  - In whole or in part
  - Regardless of the call date

Example 24

- Based on a specified price in the call schedule
- $250 million Anheuser-Busch 7⅛ issue
- Issued on 7/1/1997 and due 7/1/2017
- Deferred call: 10 years
- First call date: 1 July 2007
- Redeemable: In whole or in part

Example 25 – cont’d

- Based on a specified price in the call schedule

Call price:

<table>
<thead>
<tr>
<th>12 months beginning July 1</th>
<th>Redemption price (%)</th>
<th>12 months beginning July 1</th>
<th>Redemption price (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>101.026</td>
<td>2012</td>
<td>101.513</td>
</tr>
<tr>
<td>2008</td>
<td>102.723</td>
<td>2013</td>
<td>101.210</td>
</tr>
<tr>
<td>2009</td>
<td>102.421</td>
<td>2014</td>
<td>100.908</td>
</tr>
<tr>
<td>2010</td>
<td>102.118</td>
<td>2015</td>
<td>100.605</td>
</tr>
<tr>
<td>2011</td>
<td>101.816</td>
<td>2016</td>
<td>100.303</td>
</tr>
</tbody>
</table>
Example 26

- Based on a make-whole premium provision
  $250 million Anheuser-Busch 6% issue
  Issued on 1/5/2001 and due 11/1/2041
  Redeemable: In whole or in part
  Redemption price is equal to the greater of:
  - 100% of the principal amount
  - the sum of the present values of the remaining
    scheduled payment of principal and interest, discounted
    on a semi-annual basis at the Treasury rate plus 25
    basis points

2. Put provision

- Bond issue that permits the holder to sell it back
  to the issuer prior to the stated maturity date for
  a predetermined price
  - Putable issue
  - Put price
  - First put date

3. Cap & Floor

- Cap: Floater with restriction on the maximum
  coupon rate
  - Unattractive for the investor
- Floor: Floater with restriction on the minimum
  coupon rate
  - Attractive for the investor
Example 27

- Floater
- Treasury bill: 9.00%
- Cap: 9.00%
- Coupon formula: 3-month Treasury bill + 50 bp
- Coupon rate = 9.00% + 0.5%
  = 9.50%
  > 9.00%

\[ \text{Cap is paid} \]

Example 28

- Floater
- Treasury bill: 9.00%
- Floor: 10.00%
- Coupon formula: 3-month Treasury bill + 80 bp
- Coupon rate = 9.00% + 0.8%
  = 9.80%
  < 10.00%

\[ \text{Floor is paid} \]

Practice question 3

- Coupon formula of a floating rate issue:
  1-year Treasury rate + 30 bp
- Cap: 7% & Floor: 4.5%

<table>
<thead>
<tr>
<th>1-year Treasury rate</th>
<th>Coupon rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>First reset date</td>
<td>6.3%</td>
</tr>
<tr>
<td>Second reset date</td>
<td>6.6%</td>
</tr>
<tr>
<td>Third reset date</td>
<td>6.9%</td>
</tr>
<tr>
<td>Fourth reset date</td>
<td>6.7%</td>
</tr>
<tr>
<td>Fifth reset date</td>
<td>5.9%</td>
</tr>
<tr>
<td>Sixth reset date</td>
<td>5.0%</td>
</tr>
<tr>
<td>Seventh reset date</td>
<td>4.2%</td>
</tr>
<tr>
<td>Eighth reset date</td>
<td>3.7%</td>
</tr>
<tr>
<td>Ninth reset date</td>
<td>3.3%</td>
</tr>
<tr>
<td>Tenth reset date</td>
<td>4.8%</td>
</tr>
</tbody>
</table>
Practice question 3 (Answer)

Practice question 4

- Identify the following types of bonds based on their coupon structure:
  1. Coupon formula:
     Coupon rate = 17% - 2 x 5-year Treasury rate
  2. Coupon structure:
     Year 1-3: 5.3%
     Year 4-8: 5.9%
     Year 9-15: 6.4%
  3. Coupon formula:
     Coupon rate = ΔCPI + 3%

Practice question 4 (Answer)
Section 5. 
Size of sovereign debt markets

A. US Treasury securities

Overview of the U.S. Treasury debt instruments

- U.S. Treasuries
  - Fixed-Principal Treasuries
  - Inflation-Indexed Treasuries (TIPS)
  - Treasury Strips
  - Treasury Bills
  - Treasury Notes
  - Treasury Bonds
  - Coupon Strips
  - Principal Strips
B. French Treasury securities

Total amount outstanding at 31/07/2009: 1,115,559,125,345 euros

Average life: 7 years and 12 days

<table>
<thead>
<tr>
<th>Debt</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>07/2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAT</td>
<td>552</td>
<td>593</td>
<td>610</td>
<td>641</td>
<td>681</td>
<td>719</td>
<td>792</td>
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<tr>
<td>BTAN</td>
<td>184</td>
<td>189</td>
<td>200</td>
<td>202</td>
<td>198</td>
<td>215</td>
<td>222</td>
</tr>
<tr>
<td>BTF</td>
<td>97</td>
<td>95</td>
<td>66</td>
<td>78</td>
<td>138</td>
<td>214</td>
<td>206</td>
</tr>
<tr>
<td>Total</td>
<td>833</td>
<td>877</td>
<td>876</td>
<td>921</td>
<td>1017</td>
<td>1148</td>
<td>1219</td>
</tr>
</tbody>
</table>

Université Paris-Dauphine
M1 Finance

Marchés de taux d’intérêt
UE 104

Enseignants : S. Aboura et C. Gresse
C. Other countries