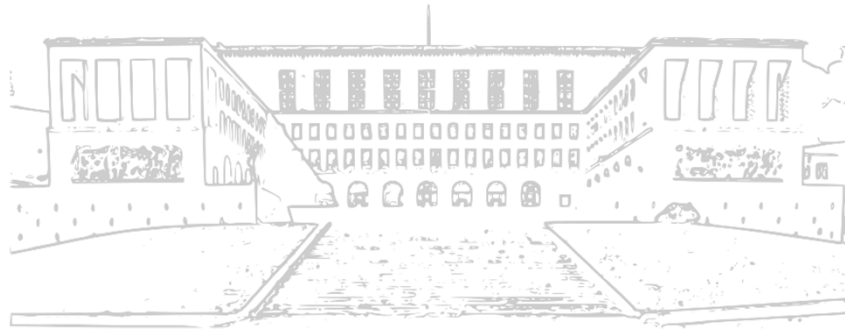


## FINANCIAL MARKETS AND INSTITUTIONS

### MONEY MARKETS

A.Y. 2016/2017  
Prof. Alberto Dreassi – [adreassi@units.it](mailto:adreassi@units.it)



### AGENDA

- Nature and purpose of money markets
- Main intermediaries active in money markets
- Main financial instruments traded in money markets

## NATURE AND PURPOSE

### Aims:

- Provide low-cost and quick mean to raise funds for short-term liquidity shortages
- Allowing returns and safety for short-term funds' availability above money's opportunity costs

### How?

- Trading quasi-money instruments (not money!), often OTC
  - very liquid (active secondary market)
  - short-termed (less than 1y, often within 3m)
- Large denomination: nominal values even in excess of millions €//\$ (wholesale market)
- Low risk of default: CBs and institutional investors are the main operators, with some degree of safety-nets

## NATURE AND PURPOSE

### Why so important?

- Markets are not perfectly efficient
- Markets are limited by regulation
- Banks are unable to provide full coverage to short-term temporary funds' excesses or deficits:
  - Banks are subject to reserve requirements to lower excessive risk taking and bank-runs due to liquidity shortages
  - Heavy regulated banking sectors are not fully competitive, leading to costs for the economy in exchange of financial stability
  - Some countries require(d) interest rate ceilings on bank deposits
  - Money markets usually experience less restrictions

## INTERMEDIARIES

- Liquidity needs can be positive or negative for the same operator: usually, intermediaries intervene as both lenders and borrowers
- Primary operators:
  - Gov.'s treasuries: the one that is always a demander (guess why)
  - Central banks: controlling liquidity in money markets by acting on gov. bonds is the primary tool for IR management and economic intervention (monetary policy)
  - Banks: for short-term gov. bonds, certificates of deposit (CDs), acceptances, interbanking funds, repurchase agreements (repos) and on behalf of customers
  - Major corporations
  - Investment corporations and securities' firms:
    - Money brokerage firms: market makers and dealers
    - Finance companies: raise funds through commercial paper (CP)
    - Insurers and pension funds: especially P/C insurers
    - Money market mutual funds: providing access to small individuals

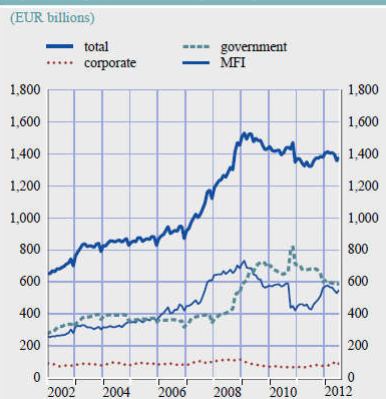
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## INTERMEDIARIES

The following data, from ECB, reports figures on the overall European money market.

**Chart 47 Outstanding amounts of euro-denominated short-term securities by issuing sector since January 2002**



**Chart B euro area money market funds' total assets**



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## INTERMEDIARIES

### Short-term gov. bonds (T-bills):

- Funding short-term liquidity shortages (f.i. gap between tax inflows and salaries' payments to public sector's employees)
- Usually ZC, discounting current and future cashflows:

$$d_{360} = \frac{NV - P}{NV} \cdot \frac{360}{days}, d_{365} = \frac{NV - P}{NV} \cdot \frac{365}{days} \quad \text{with return: } i = \frac{NV - P}{P} \cdot \frac{365}{days} > d$$

- Deemed to be default-risk free (under money sovereignty), most likely it is extremely low
- Low inflation risk due to short maturity
- Low liquidity risk: market is deep (lots of buyers/sellers) and liquid (quick operations with low transaction costs)
- Placement usually occurs through biddings (competitive and noncompetitive)
- Dematerialisation and IT innovations
- Extremely low IR, with real IR sometimes negative

## BIDDINGS

### Competitive bidding:

- Maturity, amount and features are announced
- Operators make P/Q bids that are classified by the offered price (H to L) or, equivalently, required yield (L to H)
- Bids are accepted until the total amount is achieved
- Each bid is priced as of the last highest accepted bid

### Noncompetitive bidding:

- Bidders communicate only amounts (not prices)
- All offers are accepted and granted the price of a linked competitive bidding
- Giving up price requirements, bidders are sure to be accepted

Some regulation and discipline is needed to avoid market cornering

Several sophistications of these models are present (f.i. see Italy)

## BIDDINGS

### Italian T-bills (BOT)

- Max 3 offers from any operator, each greater than 1,5 million €
- Limits:
  - Maximum acceptable price (PMA): avoid too low returns for investors
  - Exclusion price (EP): avoids too high returns for borrower
- Consider 3 op.s (1, 2, 3), each with three offers, participating to 1y BOT for 200 million €

| Op. | Q  | P     | Op. | Q  | P     | r     | Q_cum |
|-----|----|-------|-----|----|-------|-------|-------|
| 1   | 40 | 98,48 | 3   | 40 | 98,52 | 1,50% | 40    |
| 1   | 40 | 98,43 | 1   | 40 | 98,48 | 1,54% | 80    |
| 1   | 30 | 98,2  | 3   | 30 | 98,46 | 1,56% | 110   |
| 2   | 20 | 98,45 | 2   | 20 | 98,45 | 1,57% | 130   |
| 2   | 50 | 98,44 | 2   | 50 | 98,44 | 1,58% | 180   |
| 2   | 10 | 98,42 | 1   | 40 | 98,43 | 1,60% | 220   |
| 3   | 40 | 98,52 | 2   | 10 | 98,42 | 1,61% | 230   |
| 3   | 30 | 98,46 | 3   | 40 | 98,4  | 1,63% | 270   |
| 3   | 40 | 98,4  | 1   | 30 | 98,2  | 1,83% | 300   |
|     |    | 300   |     |    |       |       |       |

- Calculate PMA: weighted average price of the 2<sup>nd</sup> half of the amount (or asked, if D<S), -0,25%

$$AVP = \frac{(10 \cdot 98,46 + 20 \cdot 98,45 + 50 \cdot 98,44 + 20 \cdot 98,43)}{100} = 98,442$$

$$r_{PMA} = \frac{100}{98,442} - 1 - 0,25\% = 1,3327\%$$

$$PMA = \frac{100}{1 + 1,3327\%} = 98,685$$

## BIDDINGS

- If  $P > PMA$ , offer is excluded from exclusion price and average bidding price but are fulfilled at a price that is the minimum between PMA and the highest accepted price minus 10bps
- Calculate EP: weighted average price of the 1<sup>st</sup> half of the amount (or asked, if D<S), +1%

$$AVP = \frac{(40 \cdot 98,52 + 40 \cdot 98,48 + 20 \cdot 98,46)}{100} = 98,492$$

$$r_{PMA} = \frac{100}{98,492} - 1 + 1\% = 2,53\%$$

$$PMA = \frac{100}{1 + 2,53\%} = 97,531$$

- If  $P < EP$ , offer is excluded from average bidding price
- Calculate bidding price: weighted average price of the remaining offers from top to bottom until total amount is achieved

$$AVP = \frac{(40 \cdot 98,52 + 40 \cdot 98,48 + 30 \cdot 98,46 + 20 \cdot 98,45 + 50 \cdot 98,44 + 20 \cdot 98,43)}{100} = 98,467$$

$$r = \frac{100}{98,467} - 1 = 1,5569\%$$

## PRODUCTS AND SECURITIES

### Interbanking funds (f.i. e-MID):

- Funds mostly extremely short-term transferred between banks, typically 1 day
- Vast volumes: European overnight averaging around 20 billions € daily only
- Loans are unsecured (no collateral)
- Allows banks to flexibly respect reserve requirements from CB
- Allows banks to cover temporary liquidity gaps relatively cheaply or to earn returns on short-term cash availability
- Typical maturities are overnight (t, t+1), tomorrow next (t+1, t+2), spot next (t+2, t+3), but also on-sight (t, n) and broken date (k, n) are available
- IR developed here are extremely relevant (Euribor, Eonia) and affect other IR
- CBs influence these rates by acting on banking reserves or by producing/absorbing liquidity

## PRODUCTS AND SECURITIES

### REPOs:

- Similar to interbanking, but allowing participants other than banks
- Very short termed but longer than typical interbanking funds
- Loan is collateralised by securities traded in a deep and liquid market (mostly, gov. bonds)
- Lender buys now securities from borrower, the latter accepts from inception to buy them back at a specified maturity date
- Allows participants to manage their liquidity or to earn from changes in IR
- CBs are also active in the repo market, injecting or absorbing liquidity
- Low default risk but not nil

## PRODUCTS AND SECURITIES

### CDs:

- Securities issued by banks documenting a deposit and bearing a maturity date and interest rates (fixed or variable)
- They represent term securities, not demand deposits
- Could be bearer instruments, allowing an easier negotiability
- Their interests follow closely short-term gov. bonds, usually with a premium
- Maturities are generally between 1m and 4m, concentrated in shorter maturities
- Face values are mostly greater than 1 million \$

## PRODUCTS AND SECURITIES

### Commercial paper:

- Unsecured promissory notes issued by (few) enterprises
- Maturity within 270 days, but most are much shorter (20-45 days)
- To allow for liquidity, only major and secure corporations issue such securities
- Usually, issued as ZC
- Mostly directly placed from issuer to lender, otherwise through dealers (banks)
- Secondary markets are not deep and liquid
- If sold through dealers, they usually allow for early (costly) repurchase
- Could be indirectly secured by a banking line of credit
- Asset-backed commercial paper (ABCP): secured by a specified asset (f.i. mortgages), but quality of security depends heavily on quality of pledged assets (as underlined by the recent crises)

## PRODUCTS AND SECURITIES

### Banker's acceptances:

- Order to pay a specific amount to the instrument's bearer at a determined maturity date
- Frequently used in international commerce, where goods are ordered but have not been transported yet
- Allow international commerce even if seller does not know how creditworthy the buyer is
- Often banks exert some quality control and deliver good's documents to buyer, guaranteeing the buyer from unknown defects of ordered goods before making a payment
- Also, allows seller to avoid foreign currency risk, since payment is denominated in local currency

## PRODUCTS AND SECURITIES

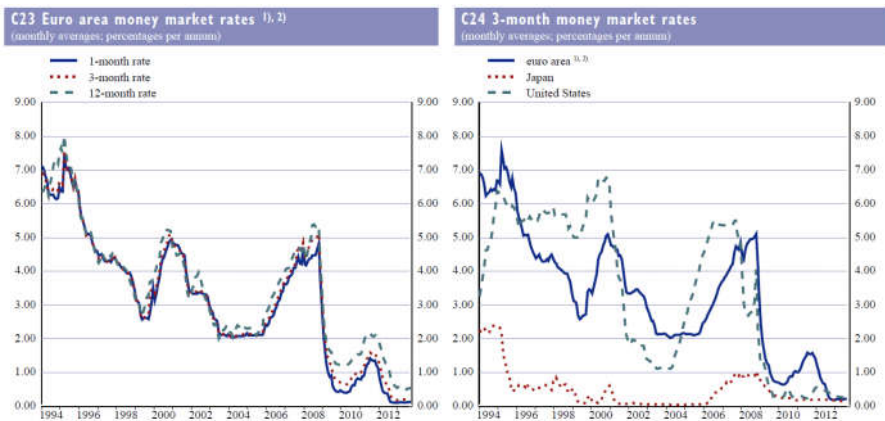
### Eurodollars:

- Deposits in dollars made outside the US
- Higher returns than in domestic market due to less restrictive regulation
- Important role of the London interbank market, offering alternative to US' interbanking funds in Eurodollars and developing reference IR such as LIBOR (London Interbank Offer Rate) and LIBID (London Interbank Bid Rate)
- Deep market, highly competitive (spreads below 0,125%)
- Maturities and other features similar to interbanking funds
- Also, Eurodollar CDs and other Eurocurrencies are available (yet still thin markets)



## EXAMPLES

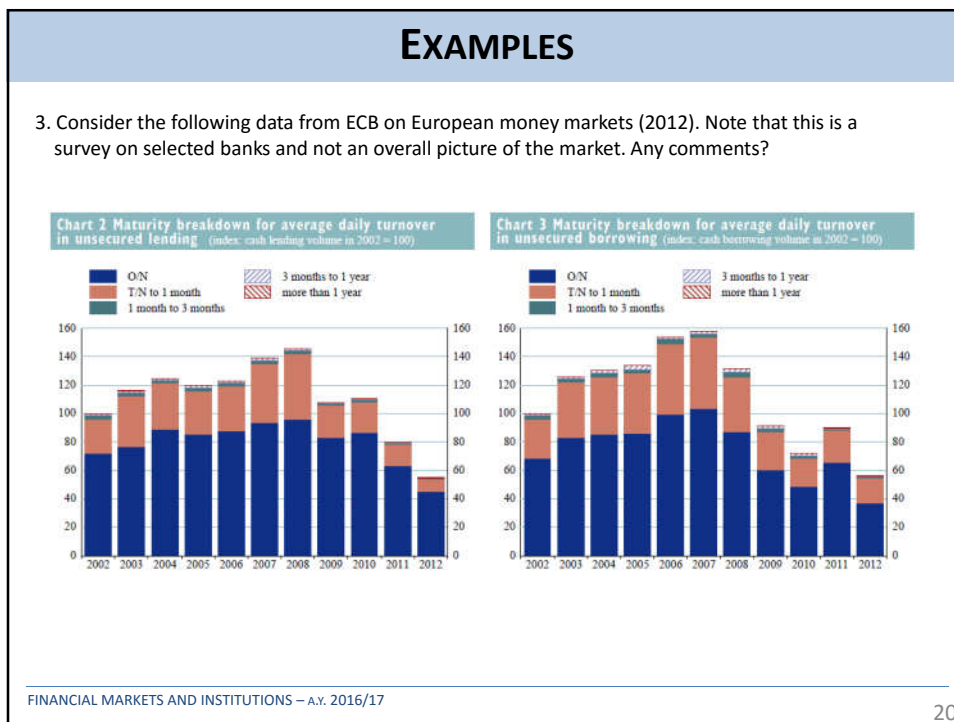
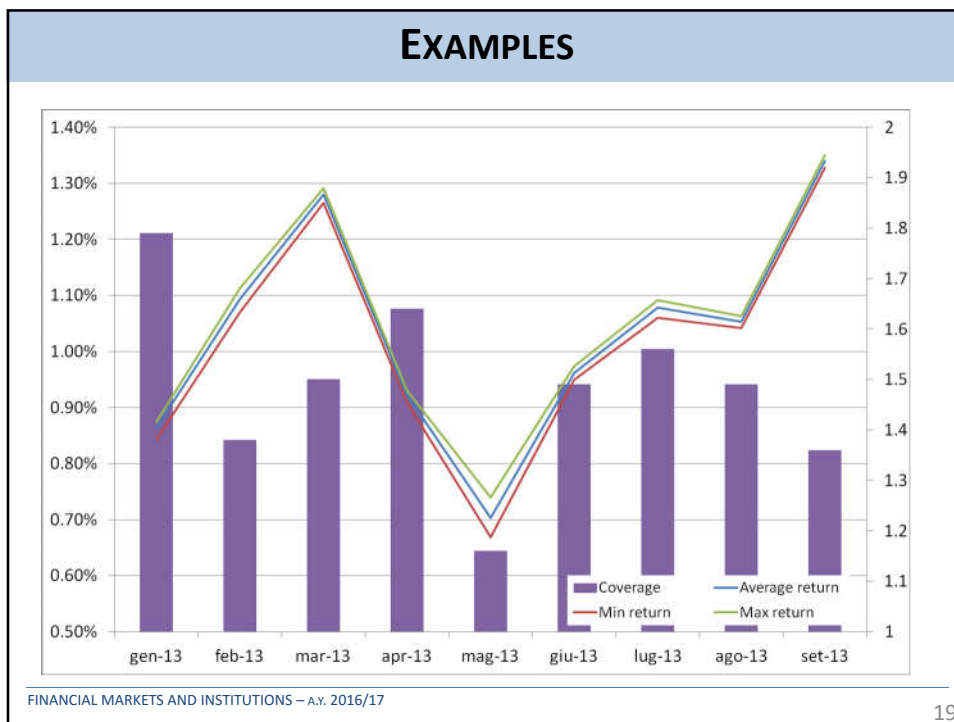
1. Consider the following data from ECB on European money market rates. Any comments?



## EXAMPLES

2. The following table presents some data from recent auctions of Italian gov. 1y zero-coupon bonds. Any comments?

|                  | 01/13  | 02/13  | 03/13  | 04/13  | 05/13  | 06/13  | 07/13  | 08/13  | 09/13  |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Offer (mln €)    | 8,500  | 8,500  | 7,750  | 8,000  | 7,000  | 7,000  | 7,000  | 7,500  | 8,500  |
| Average return   | 0.864% | 1.094% | 1.280% | 0.922% | 0.703% | 0.962% | 1.078% | 1.053% | 1.340% |
| Min return       | 0.843% | 1.070% | 1.265% | 0.909% | 0.669% | 0.949% | 1.060% | 1.042% | 1.328% |
| Max return       | 0.874% | 1.113% | 1.291% | 0.930% | 0.740% | 0.974% | 1.091% | 1.063% | 1.350% |
| Coverage         | 1.79   | 1.38   | 1.50   | 1.64   | 1.16   | 1.49   | 1.56   | 1.49   | 1.36   |
| Exclusion return | 1.859% | 2.087% | 2.274% | 1.917% | 1.693% | 1.957% | 2.071% | 2.049% | 2.335% |



## EXAMPLES

Chart 9 Is the unsecured segment in your opinion efficient?  
(percentages of total)

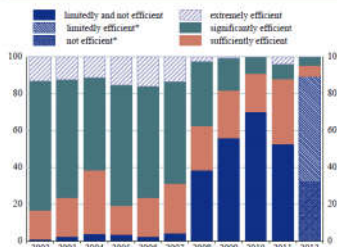


Chart 9 Has the market liquidity in the unsecured market changed with respect to last year? (percentages of total)

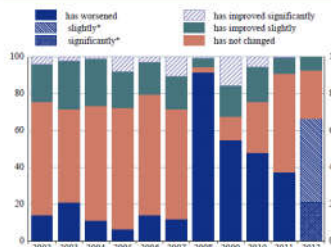


Chart 22 Is the secured segment in your opinion efficient?  
(percentages of total)

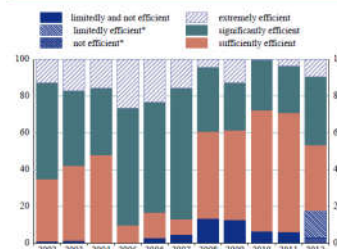
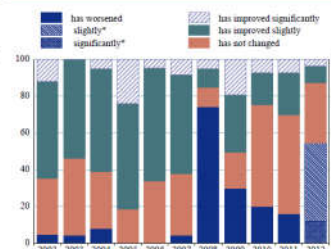


Chart 23 Has the market liquidity in the secured market changed with respect to last year? (percentages of total)



Same source.  
Comparing perception of efficiency in secured and unsecured markets