Topic 5

Bank capital adequacy regulation

Rationales for Capital Regulation

- Bank Equity Capital:
  - Must be sufficient to *absorb* unanticipated losses
  - *Write-off*: profit↓ → cumulated retained profits ↓
  - *Share capital*: cannot be taken away for loss, but
    - Allow retained profit to go negative
    - Can rebuild cumulated profits by not distributing dividends
  - *Objective*:
    - Protect creditors (deposits & other lenders to the bank)
    - Maintain stability of the financial system
- Rationale for regulation and international regulation
  - Bank *underestimate* the safety aspect (private cost of failure < social cost)
    → tend to choose a level of capital lower than what is socially desirable
  - The *harmonization* of the rule is a necessity when financial markets are global
- Principles of Regulation
  - Main regulation imposed on banks (*pre-emptive* approach)
  - Enforce a *minimum capital level* for banks → as a proportion of some measurement of the assets
  - Aim: backing the risk

Requirements of Basel Capital Regulation

- Basel Accord: *International regulation* to all industrial countries though BIS (Bank of International Settlements)
  - *Basel I* (1998): applicable from 1993
  - *Basel II* (2004) applicable from end 2007
  - *Basel III* (2010) applicable from January 2013
- Principles of Basel Accords
  1) *First pillar* Impose a minimum size to the regulatory capital （as a % of the risk-weighted asset side)
     - Risk Weighted Asset = sum of assets each weighted by a coefficient representing exclusively *credit risk*

$$Risk\ Asset\ Ratio = \frac{regulatory\ capital}{risk\ weighted\ assets} \geq minimum\ ratio$$

$$regulatory \geq minimum\ caiptal\ requirement = minimum\ ratio \times risk\ weighted\ assets$$

  2) *Second pillar*
     - Supervisory review process Supervisors will evaluate bank measurement techniques with respect to credit and operational risks and possible impose a different minimum capital ratio
  3) *Third pillar*
     - Market discipline Banks are required to increase their information disclosure (measurement of risk and operational risk)

- 3 minimum ratios to be met simultaneously (Basel 3)

  When capital base is:

  - *Common Equity Tier 1 capital* → minimum ratio: 4.5%
  - *Tier 1* → minimum ratio: 6% (used to be 4%)
  - *Total equity* → minimum ratio: 8%

- Minimum Leverage ratio

  - minimum Tier 1 leverage ration: 3%

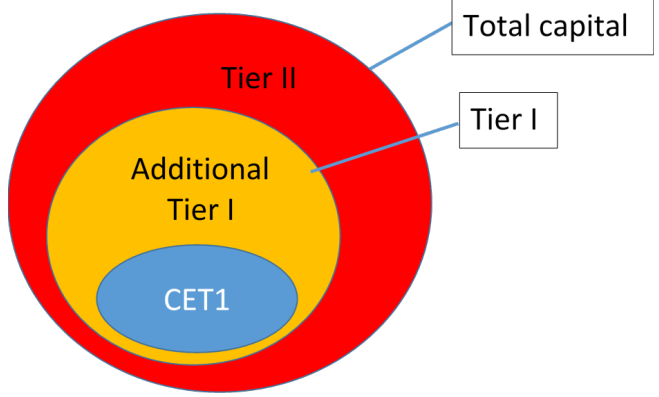
$$\frac{Tier\ 1}{Total\ asset} \geq 3\%$$

  - New to Basel III to be implemented in 2018

- Other risks covered by minimum ratio

  - Market risk (amendment during Basel I)
  - Operational risk (since Basel II)
  - Interest rate risk in Australia
  - Not incorporated in weights

Regulatory Capital



- Capital in Basel regulation
- Tier 1 (highest quality)
  - *Common equity Tier 1* (fundamental tier I)
    - A component of Tier 1 capital that consists mostly of common stock held by a bank or other financial institution
    - Ordinary shares, retained earnings, current year earnings, reserves from revaluation of securities, foreign conversion reserves*Additional Tier 1*
    - Perpetual non-cumulative preference shares, perpetual non-cumulative capital notes
- Tier II (lower quality)
  - Perpetual cumulative preference shares
  - Term subordinated debt, life limited redeemable preference shares

Risk Weighted Assets (in Basel)

- Adhoc weights

  Each component of the asset side was weighted according to the *nature of the issuer*

  - Cash and loans to OECD governments: 0
  - Loans to non-OECD governments, local authority lending, interbank lending: 0.2
  - Mortgages: 0.5
  - Commercial lending: 1

- Basel I weight not risk-sensitive enough

Assets Good bank	Assets Bad bank	£ million	Basel I Weight
Sovereigns Loans: Canada government (AAA/Stable/A-1+)	Sovereigns Loans: Belize Government (CCC+/Negative/C)	45	0.0
Loans to other Banks: HSBC Bank plc (AA-/Stable/A-1+)	Loans to other Banks: B.I.N. Bank (CCC+/Stable/C)	20	0.2
Corporate Loans: Canon Inc (AA/Stable/A-1+)	Corporate Loans: PetroQuest Energy Inc(CCC+/Stable/--)	25	1.0
Household Mortgage Loans	Household Mortgage Loans	10	0.5
Total Assets	*Total Assets*	*100*	

- RWA for good and bad banks$= 45 * 0 + 20 * 0.2 + 25 * 1.0 + 10 * 0.5 = 34$
- Required Tier 1 capital for good and bad banks$= 34 * 4\% = 1.36$
- Required Total Capital for good and bad banks$= 34 * 8\% = 2.72$

- *Regulatory Arbitrage:*

  ∵capital requirement is defined by bucket not the real level of risk

  ∴banks have an incentive to lend into highest risk projects of the category

  →generate highest return

2) Internal Ratings Based (IRB) approach

- Banks can use their *own credit risk models* to estimate the risk of their borrowers:
  - Probability of default, loss given default, exposure at default, effective maturity
- Then a *risk-weight function* converts these inputs into a risk right
- Weight risk coefficients (standardized) < Weight risk coefficients (IRB)

  → create an inventive for bank to improve their own assessment of risk
- Treatment of *residential loans*:
  - No external credit rating for households
  - *Residential mortgage loans* weight depends on *Loan to Valuation Ratio* (LVR): 0-80% LVR: 35% weight
    - 80-90% LVR: 50% weight
    - 90-100% LVR: 75% weight
    - >100% LVR: 100% weight

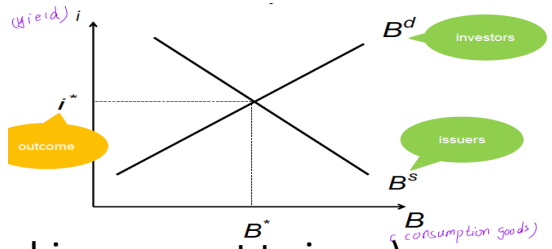
	Basel 1	Basel 2	Basel 3
Common Equity Tier 1	2%	2%	4.5%
Tier 1	4%	4%	6%
Total equity	8%	8%	8%
Weight	Adhoc by type	Credit rating conversion table IRB	Credit rating conversion table IRB

Topic 6

Behavior of interest rates

Term and risk structure of interest rates

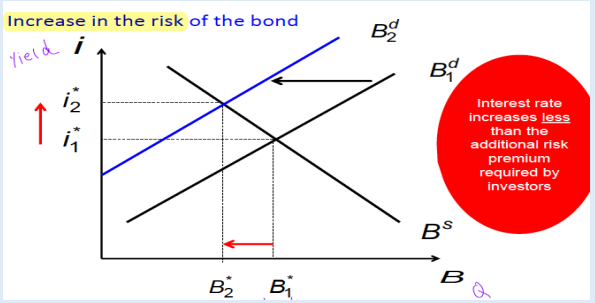
The behavior of interest rates



- Type of security: bond
- *Stocks*: demand for bonds (quantity of bond investors want to hold) and supply for bonds (quantity of bond issuer want to issue)
- Higher expected yield → larger demand → smaller supply
- **Determinants** of demand and supply of a bond:

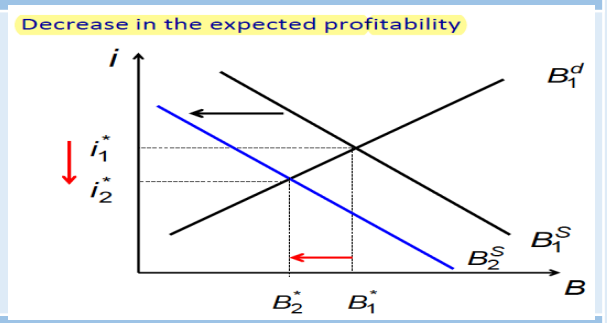
Demand curve for a bond:

- Right for wealth and liquidity of the bond (higher wealth/more liquid → higher demand)
- Left for risk of the bond, default probability of the bond and expected inflation (higher expected inflation → lower demand)
- Left for liquidity of alternative assets (more liquid the alternative assets → lower demand)
- Right for risk of alternative assets, default probability of alternative assets



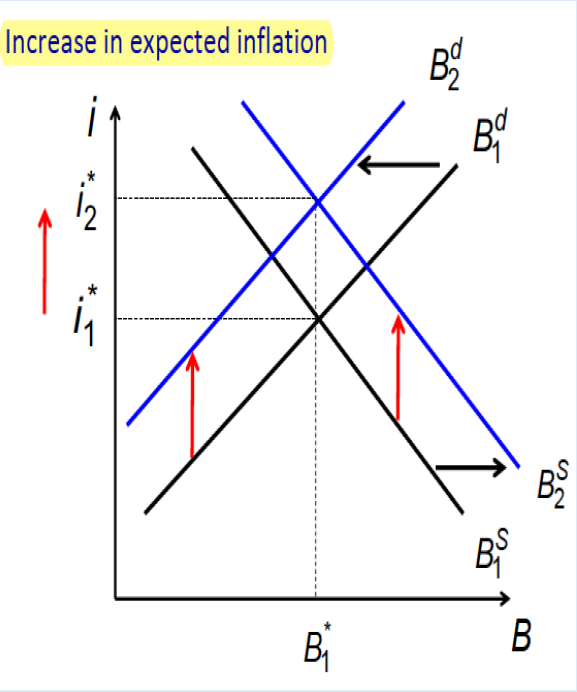
Supply curve of a bond:

- Expected profitability of investment opportunities (higher profitability → higher quantity supplied)
- Cost of borrowing (higher cost relative to other sources of funds → lower supply)
- Expected inflation (increase in expected inflation → increase supply → lower real cost)



Equilibrium interest rate

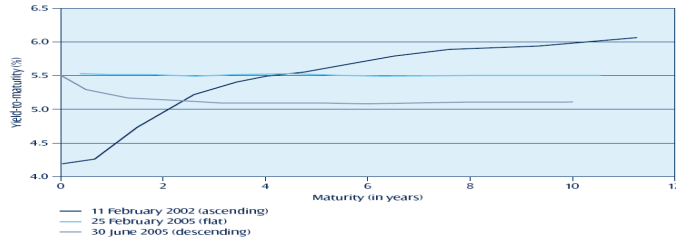
- Interest rate is in *nominal* terms



- Expected inflation↑ → nominal interest rate↑ → *Fisher Effect*

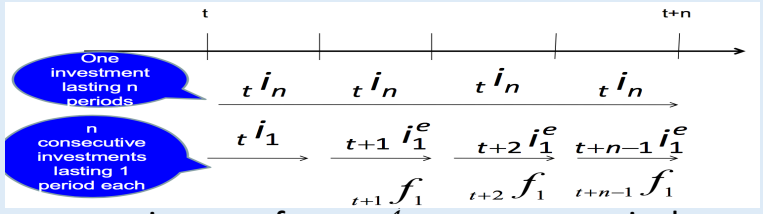
The Term Structure of Interest Rates

- The relationship between yield and term to maturity → measured with other factors held constant (e.g. default risk, marketability) → x-axis: Residual maturity; y-axis: promised nominal yield to maturity
- **Three empirical facts:**
  1) The interest rates on bonds of different maturity move in the same direction (all up or down)
  2) When short-term interest are low → YC is more likely to be ascending; when short-term interest rates are high → YC is descending
  3) YC almost always slope upward
- **Theories of term structure:**



Expectations Theory

- An explanation of the shape of the yield curve → YC is determined by investors' *expectations of future* interest rates
  - E.g. upward curve → interest rate↑
- *Perfect substitutability* among maturities: (invest in one n period maturity bond = invest in n consecutive 1 period bonds)
  - Any difference in yields between the two transactions would give rise to arbitrage → affect prices → bring back the equality



- ${}_a^ib \rightarrow a = starting\ period; b = duration\ for\ rates$
  - E.g. $1^{i^e}1$: 1 year interest rate starting at time 1
- i vs. i^e:
  - If 'a' = 0 → i
  - If 'a' ≠ 0 → i^e
- Long- term interest factor ${}_t i_n$ → a geometrical average of the current and expected future short-term interest rates:

$$ {}_t i_n = \frac{{}_t i_1 + {}_{t+1} i^e{}_1 + {}_{t,2} e_1 + \cdots + {}_{t,n\ 1} i^e{}_1}{n} $$

- Ascending/expectation of increase: $(1 + {}_t i_3) = [(1 + {}_t i_1)(1 + {}_{t+1} i^e{}_1)^2]^{1/3}$; $(1 + {}_t i_4) = [(1 + {}_t i_1)(1 + {}_{t+1} i^e{}_1)^3]^4 \rightarrow {}_t i_1 < {}_t i_3 < {}_t i_4$
- *Explanatory power*: (1) compatible with fact 1: increase in current short-term interest rate affects all other rates → current long-term rates also move up; (2) compatible with fact 2: low level of ST rate → expect to increase → higher LT rate; (3) cannot explain why YC is upward

Segmented Markets Theory

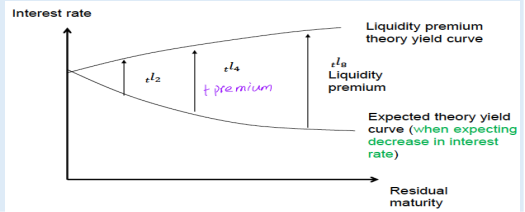
- Bonds with different maturities are *absolutely not substitutable* → each yield depends on demand and supply for that maturity
- Only explains fact 3, cannot explain different shapes

Liquidity premium Theory

- Bonds with different maturities are *imperfectly substitutable*
- Long-term interest rates = an average of current and future ST interest+ premium *l:*

$$ {}_t i_n = \frac{{}_t i_1 + {}_{t+1} i^e{}_1 + {}_{t,2} e_1 + \cdots + {}_{t,n\ 1} i^e{}_1}{n} + {}_t I_n $$

- Fact 3 is explained: expectation of increase→ ascending curve +*l*; decrease→ascending+ descending curve



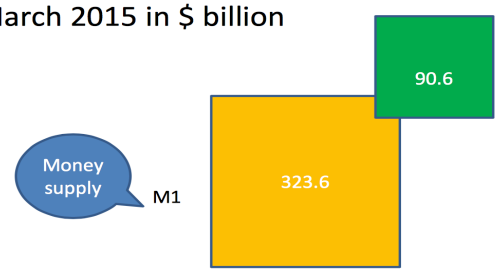
Topic 7

Implementation of Monetary Policy

Part I: Money creation and monetary policy tools

Money Multiplier

March 2015 in $ billion

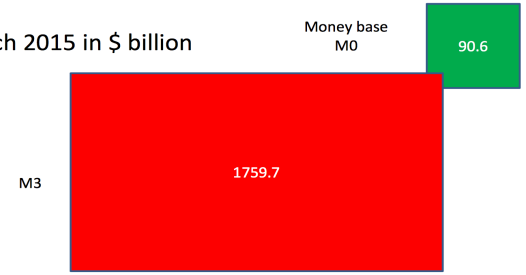


Money base
M0 or MB

$m1 = M1/MB$

= 323.6/90.6 = 3.57

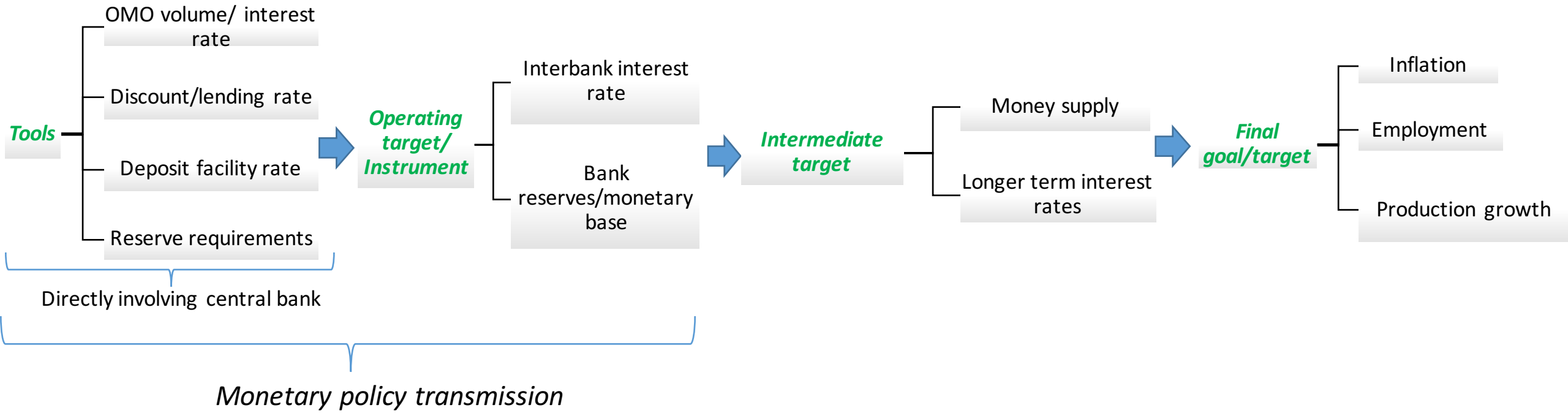
- March 2015 in $ billion



$m3 = M3/MB$

= 1759.7/90.6 = 19.42

Monetary Policy Tools and Targets



Open Market Operations (OMO)

- The central bank ***purchases (sells) securities*** in exchange for providing (withdrawing) central bank money
- In Australia, OMO implemented through auctions with *mainly commercial bank*

  In US, OMO implemented through auctions with *primary dealers*, sometimes not bank
- **Repurchase Agreements (REPO):**
  - The central bank buys a security from a bank's assets and agrees on selling back → *collateral*
  - Outright purchase of Treasury security → Indirect finance → *Monetization of the debt*
- **REPO in Australia**

Banking System	
Assets	Liabilities
Governmt Securities -$100	
Reserves (ESA) +$100	

RBA	
Assets	Liabilities
Securities +$100	ESA +$100

Banking System	
Assets	Liabilities
Governmt Securities +$100	
Reserves (ESA) -$105	Equity -$5

RBA	
Assets	Liabilities
Securities -$100	ESA -$105
	Equity +$5

- **REPO in US**

Banking System	
Assets	Liabilities
Reserves (fed funds) +$100	Deposits dealers +$100

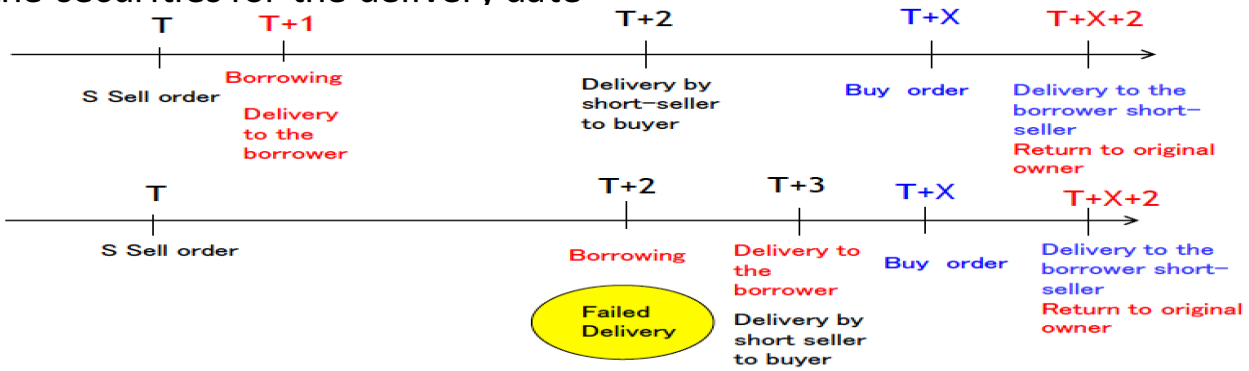
Federal Reserve	
Assets	Liabilities
Securities +$100	Fed funds +$100

Banking System	
Assets	Liabilities
Reserves (fed funds) -$105	Deposits dealers -$105

Federal Reserve	
Assets	Liabilities
Securities -$100	Fed funds -$105 Equity +$5

- **Securities accepted** for OMO by RBA from banks:
  - Government securities
  - Banks bill, bank issued bonds, CD, foreign currency
  - ABCP and RMBS for *repos* exclusively
- **RBA OMO auctions**
  - *Daily Discriminatory variable-rate auctions auctions*
  - Banks (and dealers) have 15 minutes to communicate their bids or offers to the RBA and also maturity preference for REPO
  - The Reserve Bank of Australia (RBA) controls the *quantity* in its auctions and the *price* in its liquidity facility.

- **Naked Short Selling:**
  - *No lending arrangement* to get the securities has been made at the time of the sell order
  - The seller however should get the securities for the delivery date



  - Surprisingly, when a security has been bought prior to the short sell order it is considered as naked short sale: