WELCOME

Overview of Financial Markets and Instruments

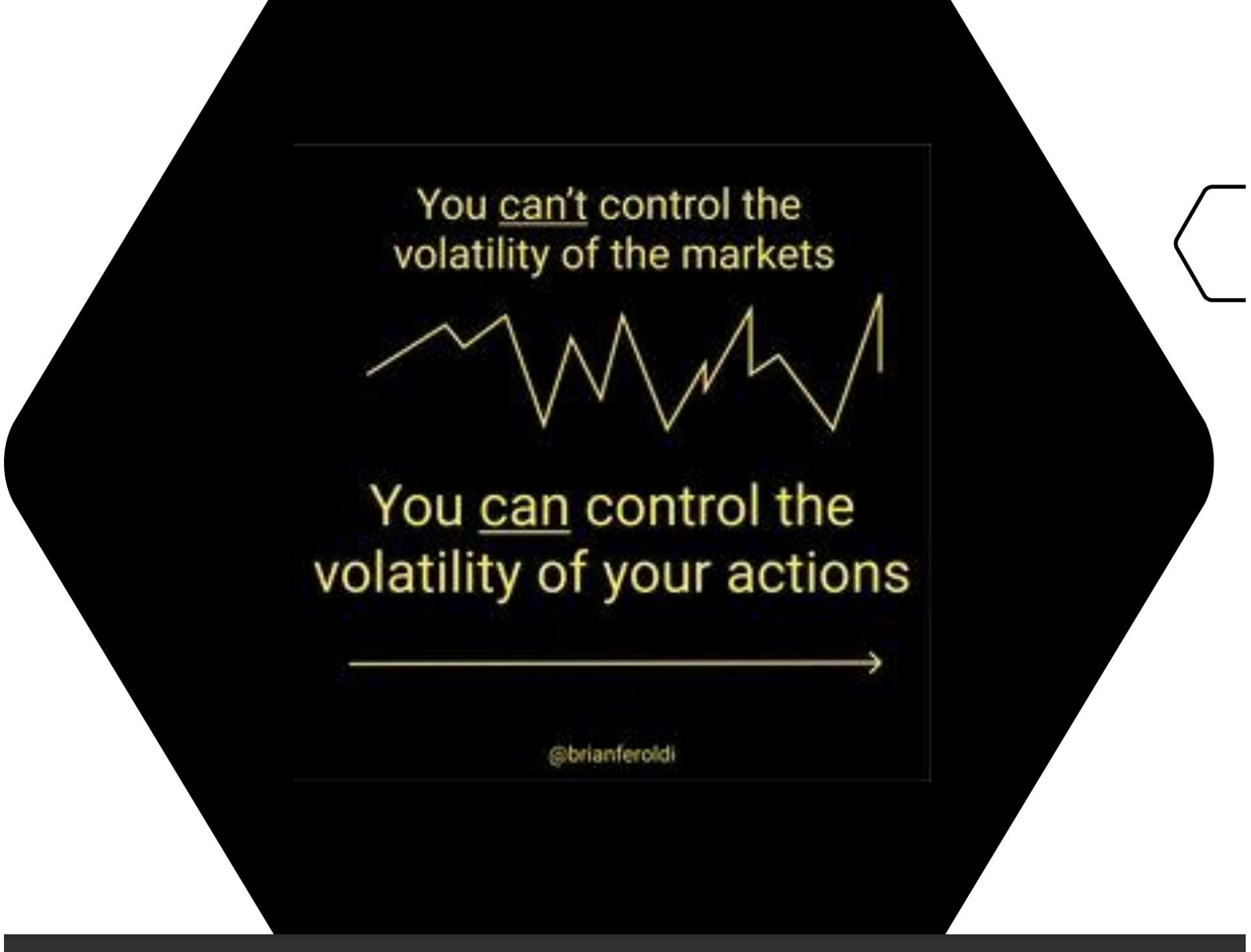
Module 1 Session 3,4 , 5 & 6

By: Prof. Shalini Agnihotri

This is the time when we have to keep our mind and eyes both open...

“The lie, of course, is more interesting.”

— John Irving


You can't control the volatility of the markets
You can control the volatility of your actions
@brianferoldi

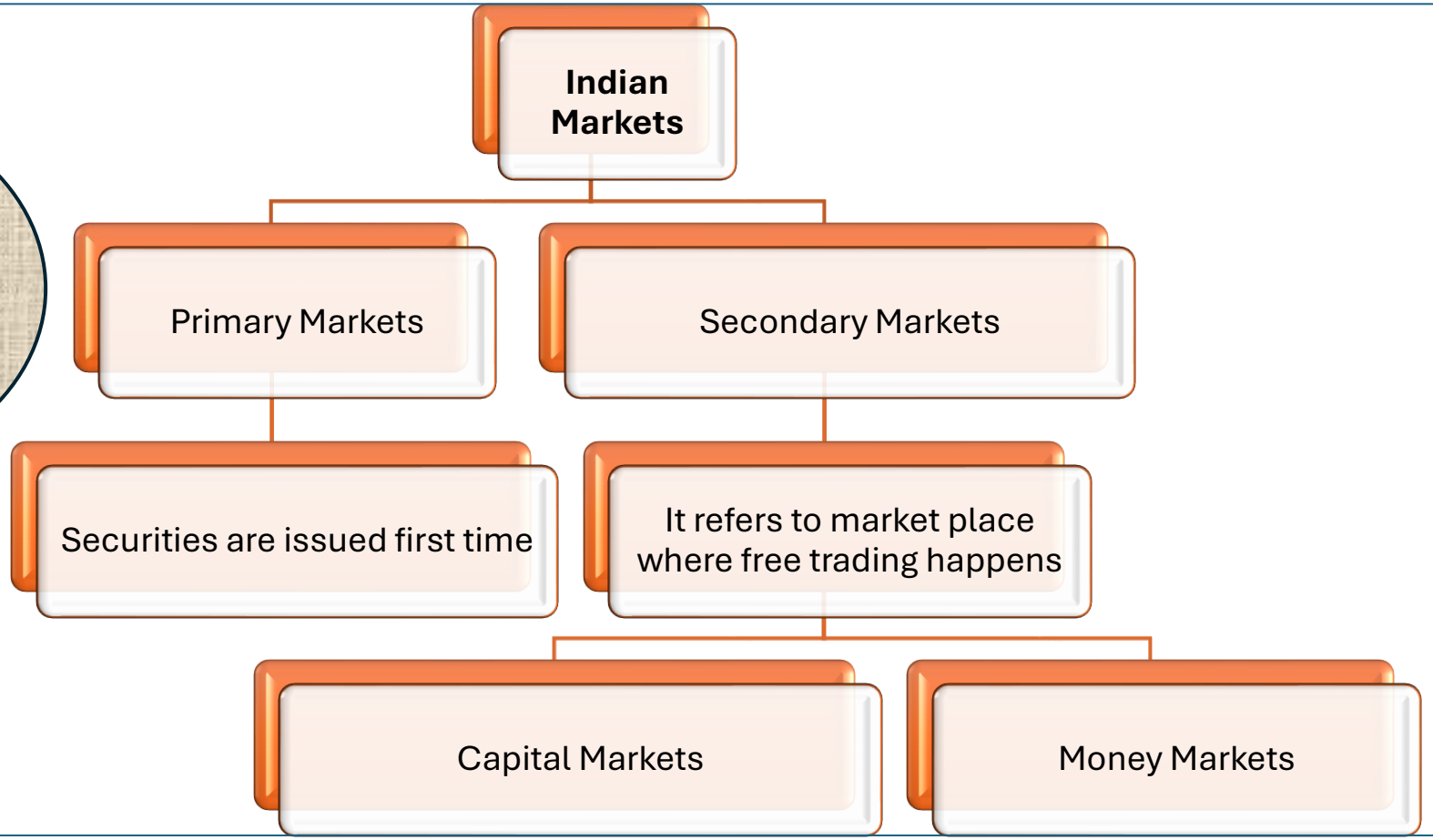
Market	Description
Stock Market	Market for buying and selling shares (ownership) of publicly traded companies. Investors can purchase shares to gain ownership and potentially earn returns through capital appreciation and dividends.
Bond Market	Market for trading debt securities (bonds) issued by governments, corporations, and municipalities. Investors buy bonds and receive periodic interest payments and the return of principal amount at maturity.
Foreign Exchange Market (Forex)	Market for exchanging one currency for another. Participants include individuals, businesses, and financial institutions. Forex trading facilitates international trade and investment, and currency speculation.
Commodity Market	Market for buying and selling commodities like gold, oil, agricultural products, and metals. Investors trade commodity contracts, either for immediate delivery or future delivery at a predetermined price.
Derivatives Market	Market for financial instruments derived from underlying assets, such as options, futures, and swaps. Derivatives allow investors to speculate on price movements, manage risks, and hedge against potential losses.
Money Market	Market for short-term borrowing and lending of funds. Participants include banks, corporations, and governments. Money market instruments have high liquidity and short maturities, such as Treasury bills and commercial paper.
Capital Market	Market for long-term borrowing and lending of funds. It includes both the stock market and bond market, enabling companies and governments to raise capital for investment and expansion.
Insurance Market	Market for insurance policies where individuals or entities transfer risk to insurance companies in exchange for premiums. Insurance markets offer coverage for various risks, including life, health, property, and liability.
Real Estate Market	Market for buying, selling, and renting properties such as land, residential homes, and commercial buildings. Real estate markets involve transactions, investments, and the development of physical properties.
Futures Market	Market for trading futures contracts that obligate buyers and sellers to transact a specific asset at a predetermined price and date in the future. It allows participants to speculate on price movements and manage risks.

Types of markets: a hierarchy

- Direct search: Buyers and sellers find each other directly, without intermediaries.
- Brokered markets: Buyers and sellers rely on intermediaries to find each other. Intermediaries generally do not act as principals (e.g., residential real estate).
- Dealer markets: Buyers and sellers rely on intermediaries. Intermediaries often act as principals, maintaining inventories and standing ready to supply immediacy (i.e., they are willing to buy and sell when a customer demands it). In most cases, the final buyers and sellers do not have direct access to the market.
- Auction markets: Centralized Buyers and sellers interact directly with each other. Dealer presence is minimal.

Indian Markets

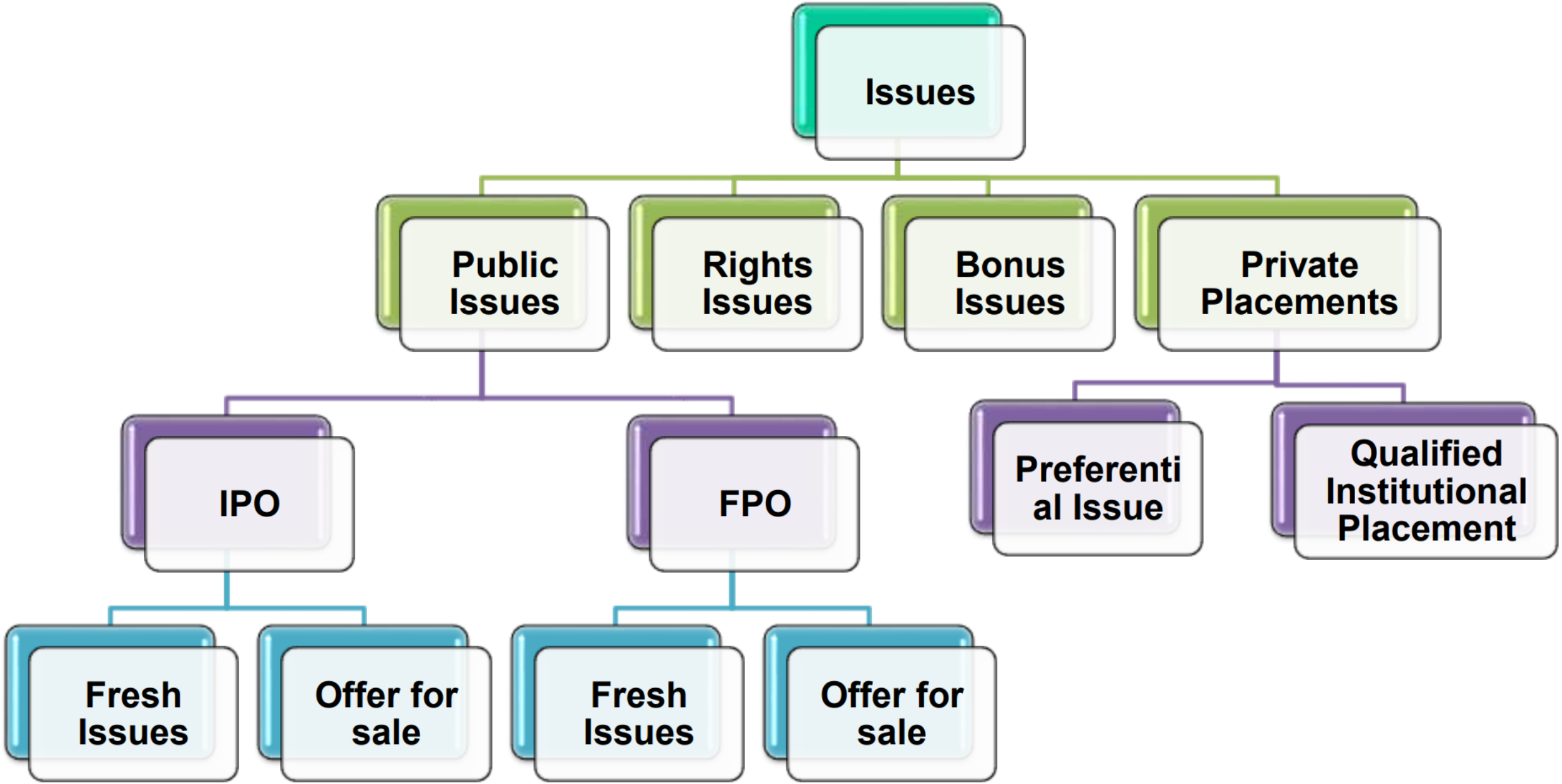
Intermediaries Play essential role in selling debt securities in primary markets



Indian Markets

Investors who lend money to borrowers are:

- Insurance companies
- Mutual funds
- Pensions funds
- Retail investors


Issues
Public Issues
Rights Issues
Bonus Issues
Private Placements
IPO
FPO
Preferenti al Issue
Qualified Institutional Placement
Fresh Issues
Offer for sale
Fresh Issues
Offer for sale

Regulators

- The process of mobilizing resources is carried out under the supervision and overview of the regulators.

- Department of Economic Affairs (DEA)
- Ministry of Corporate Affairs (MCA)
- Reserve Bank of India (RBI)
- Securities and Exchange Board of India (SEBI)-The orders of SEBI under the securities laws are appealable before a Securities Appellate Tribunal (SAT).

Table 1.6: Market Participants in Securities Market

Market Participants	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018$
Securities Appellate Tribunal (SAT)	1	1	1	1	1
Regulators*	4	4	4	4	4
Depositories	2	2	2	2	2
Stock Exchanges					
Cash Market	20	18	18	5	5
Equity Derivatives Market	3	3	3	3	3
Currency Derivatives Market	4	3	3	3	3
Brokers (Cash Segment)**	9,411	3,744	3,219	3,192	3,202
Corporate Brokers (Cash Segment)	4,917	3,290	2,820	2,775	2,778
Brokers (Equity Derivatives)	3,051	2,990	2,760	2,651	2,668
Brokers (Currency Derivatives)	2,395	2,406	2,205	1,985	2,310
Sub-brokers (Cash Segment)	51,885	42,351	35,246	30,610	25,642
Foreign Portfolio Investors	-	8,214	8,717	7,807	9,042
Portfolio Managers	212	188	202	218	261
Custodians	19	19	19	19	19
Registrars to an issue & Share Transfer Agents	71	72	71	73	73
Merchant Bankers	197	197	189	189	188
Bankers to an Issue	59	60	62	64	65
Debenture Trustees	31	32	31	32	32
Underwriters	3	2	2	2	1
Venture Capital Funds	207	201	200	198	196
Foreign Venture Capital Investors	192	204	215	218	220
Mutual Funds	50	47	48	45	45
Collective Investment Management Company	1	1	1	1	1
KYC Registration Agency (KRA)	5	5	5	5	5

Regulator

- The Ministry of Finance regulates through the Capital Markets Division of the Department of Economic Affairs. –
- The Division is responsible for institutional reforms in the securities markets, building regulatory and market institutions.
- Strengthening investor protection mechanism, and providing efficient legislative framework for securities markets.
- The Division administers legislations and rules made under the Depositories Act, 1996, Securities Contracts (Regulation) Act, 1956 and Securities and Exchange Board of India Act, 1992

RBI

- The Reserve Bank derives statutory powers to regulate market segments from specific provisions of the Reserve Bank of India Act, 1934.
- The prudential guidelines issued to eligible market participants form the broad regulatory framework for government securities, money market and interest rate derivatives.
- All the secondary market transactions in Government Securities are settled through a central counterparty mechanism under Delivery Versus Payment mode

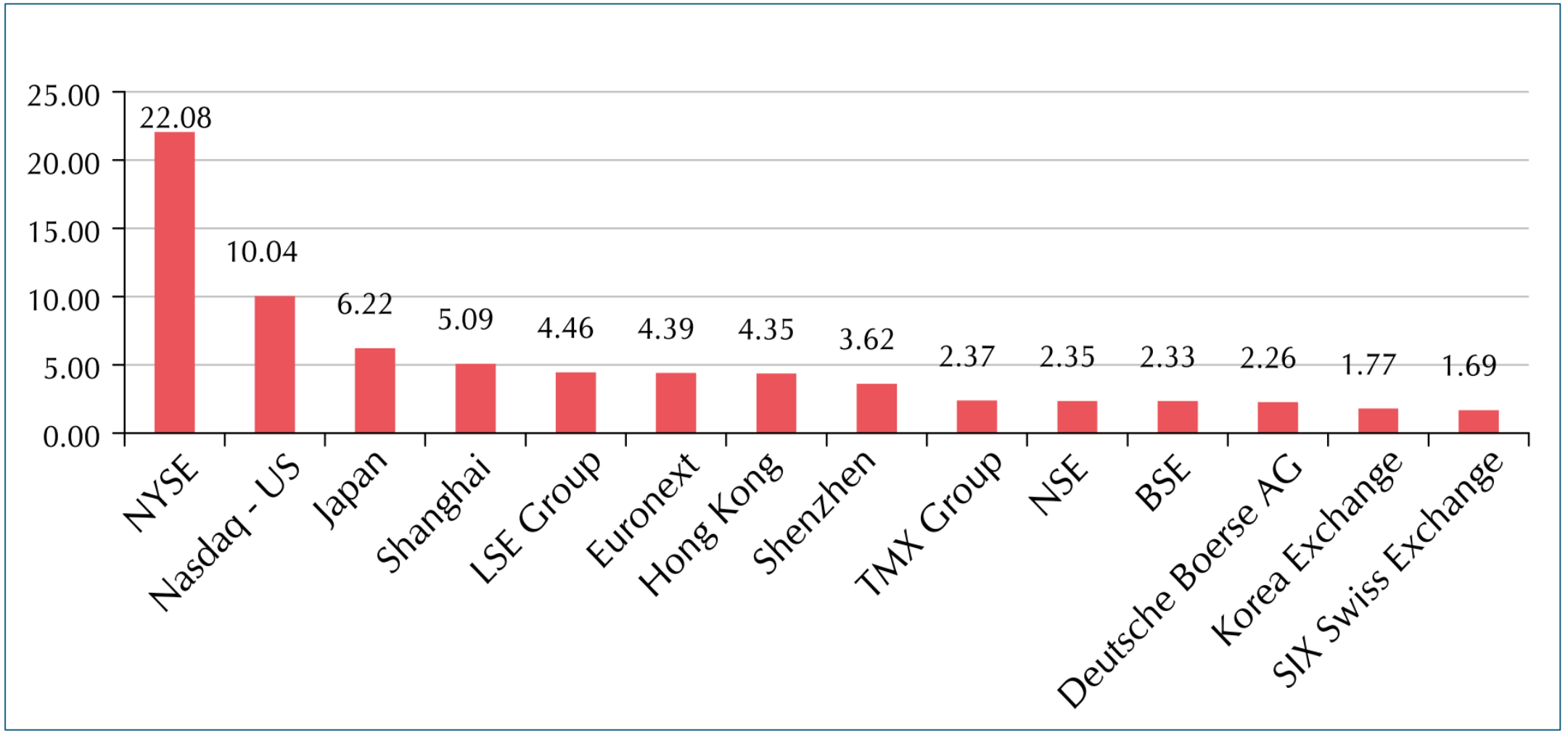
RBI Regulatory Role

- The RBI formulates detailed guidelines on each segment of the money market (collaterised borrowing, uncollaterised call money market, Commercial Paper issuances by corporates, Primary Dealers and financial institutions and Certificates of Deposit) under the section Master Circulars for financial markets.
- The powers in respect of the contracts for the sale and purchase of securities, gold-related securities, money market securities and securities derived from these securities, and ready forward contracts in debt securities are exercised concurrently by the RBI.

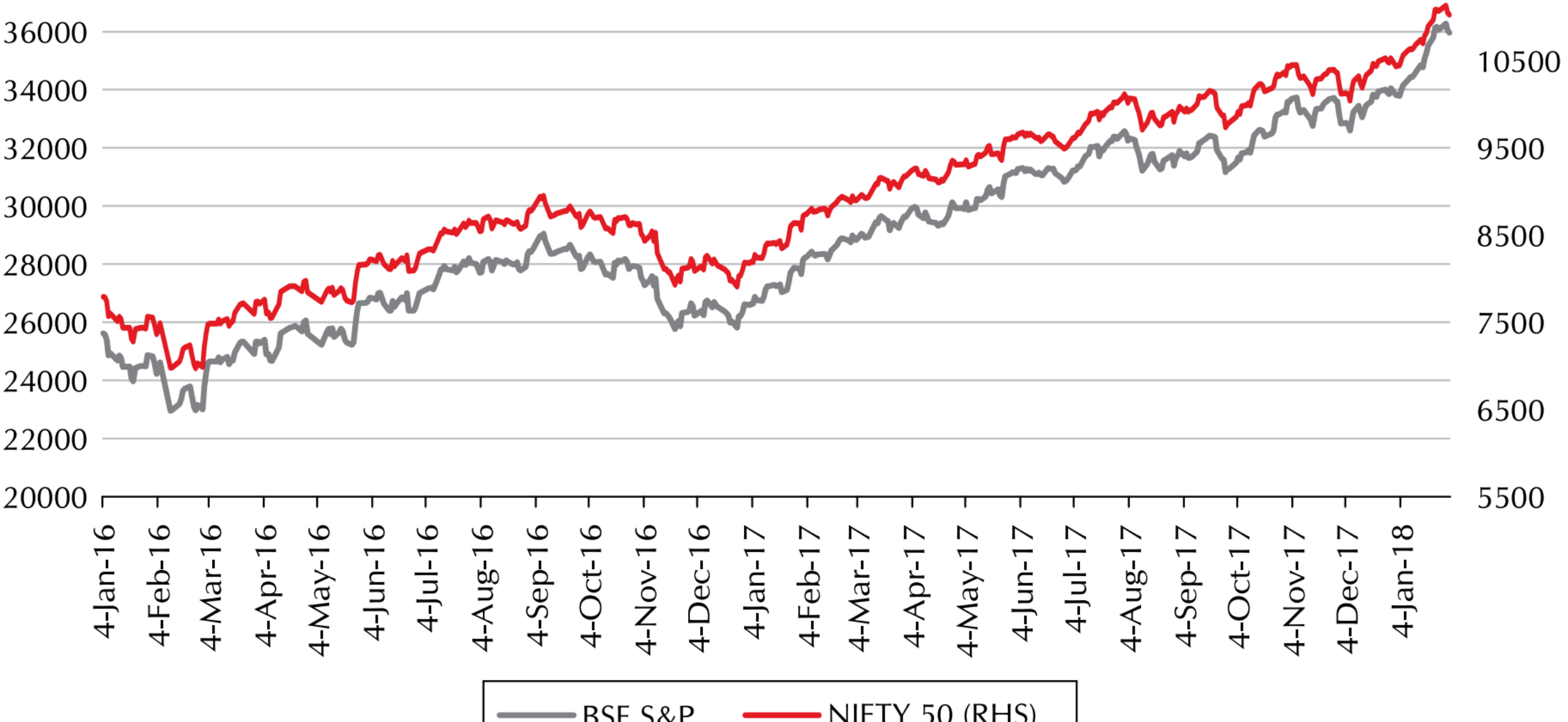
SEBI

- The SEBI is the regulatory authority established under the SEBI Act 1992 and is the principal regulator for stock exchanges in India.
- SEBI's primary functions include protecting investor interests and promoting and regulating the Indian securities markets.
- Foreign Portfolio Investors are required to register with Designated Depository Participants (DDPs) in order to participate in the Indian securities markets.
- Most of the powers under the Securities Contracts (Regulation) Act, 1956 (SCRA) can be exercised by the DEA while a few others can be exercised by SEBI.
- The powers of the DEA under the SCRA are also concurrently exercised by SEBI. Besides, the Depositories Act is administered by SEBI. The rules under the securities laws are framed by the government and the regulations are framed by SEBI.

Domestic market capitalisation(USD Trillion)



Movement in Sensex and Nifty



Market Participants and their Objectives

- **Government** – Government issue and invests in securities through the Central Bank of India.
- **Central bank of India**- RBI is the central bank of India and is a regulator of Money market. Act as intermediatory for issuing G-secs on behalf of government. Regulates Interest rates.
- **SEBI**-Regulator for equity and debt market, IPO, Mutual funds and FII's .
- **Primary Dealers**- PD's play an important role as financial intermediaries authorise to buy G-secs and sell them in the secondary market.

Market Participants and their Objectives

- **Commercial Banks**- active player in money market. Act as intermediary to corporates for issuing the CP's.
- **Financial Institutions**- It include insurance companies, provident and pension funds, mutual funds, trusts, corporate treasuries, FPI's. They issue CD and bonds.
- **Companies**
- **Retail Investors**

Money Market Instruments

- **Commercial Paper** is an unsecured short-term promissory note issued by a company to raise short-term funds mainly to meet working capital requirements.

• **CPs** are privately placed and usually held till maturity by the investors.

RBI Guidelines on issue of CPs

✓ **Eligibility:** Companies with minimum tangible net worth of Rs. 4 Crores. Should have sanctioned working capital limit from a bank and the account should be “Standard Asset”.

✓ **Minimum Credit Rating:** A-1 (as defined by SEBI)

✓ **Maturity:** Min 7 days; Max: One Year.

✓ **Denomination:** Rs 5Lacs and thereafter in its multiples.

✓ **Investors:** Individuals, Banks, Companies, NRIs, FIIs (within limits set by SEBI) , Financial Institutions can invest in CPs.

✓ CPs issued at a discount to the Face Value.

Commercial Paper (Contd.)

Effective Cost of CPs: =

$$\left[\frac{\text{Face Value - Sale Price}}{\text{Sale Price}}\right]\times\left[\frac{360}{\text{No. of Days}}\right]$$

- Calculate the **effective cost** of Commercial paper with Face Value of Rs 1,00,000/-, Issue Price of Rs 97,000/- and Issue Expenses 1,000/- per CP.

$$\left[\frac{1{,}00{,}000-96{,}000}{96{,}000}\right]\times\left[\frac{360}{120}\right]=12.50\%$$

Issue Expenses: Credit rating ; Issuing & Paying Agents Fees & Stamp Duty.

Certificates of Deposits

- Certificates of Deposit (CD), introduced in June 1989, are essentially securitized short-term time deposits issued by banks during periods of tight liquidity, at relatively high interest rates
- But the transaction cost of CDs is often lower as compared with that of retail deposits. When credit picks up, placing pressure on banks' liquidity, banks try to meet their liquidity gap by issuing CDs, often at a premium.

Call/Notice Money Market

- The overnight inter-bank call money market, in which banks trade positions to maintain cash reserves, is the key segment of the money market in India.
- The call money market (CMM) the market where overnight (one day) loans can be availed by banks to meet liquidity.
- Banks who seeks to avail liquidity approaches the call market as borrowers and the ones who have excess liquidity participate there as lenders.
- The CMM is functional from Monday to Friday. Banks can access CMM to meet their reserve requirements (CRR and SLR) or to cover a sudden shortfall in cash on any particular day.
- Effectively, the call Money Market is the main market oriented mechanism to meet the liquidity requirements of banks.
- It is basically an 'over the counter' (OTC) market without the intermediation of brokers. Participation has been gradually widened to include other financial institutions, primary/satellite dealers, mutual funds and other participants in the bills rediscounting market and corporates (through primary dealers) besides banks, LIC and UTI. While banks and primary dealers are allowed two-way operations, other non-bank entities can only participate as lenders.

Call Money Market

- The call money market is influenced by liquidity conditions (mainly governed by deposit mobilization, capital flows and the Reserve Bank's operations affecting banks' reserve requirements on the supply side and tax outflows, government borrowing programme, non-food credit off-take and seasonal fluctuations, such as, large currency withdrawals during the festival season on the demand side).
- At times of easy liquidity, call rates tend to hover around the Reserve Bank's repo rate, which provides a ready avenue for parking short-term surplus funds.
- During periods of tight liquidity, call rates tend to move up towards the Bank Rate and more recently the Reserve Bank's reverse repo rate (and sometimes beyond) as the Reserve Bank modulates liquidity in pursuit of monetary stability.

Mechanism of Call Money Market

- Loans are availed through auction/negotiation.
- The auction is made on interest rate.
- Highest bidder (who is ready to give higher interest rate) can avail the loan. Average interest rate in the call market is called call rate.
- Dealing in call money is done through the electronic trading platform called Negotiated Trading System (NDS).
- This call money rate is an important variable for the RBI to assess the liquidity situation in the economy.
- The CMM is known as the most sensitive segment of the financial system. Since the participants are banks, the call money rate tells about the overall liquidity position in the economy.
- Higher call rate indicates liquidity stress in the economy. In this case, the RBI may follow up with liquidity support measures through its monetary policy instruments – cutting CRR or allowing more repos. Hence, the call money rate is taken as the operating target of monetary policy.

Notice Money

- The call money is usually availed for one day. If the bank needs funds for more days, it can avail money through notice market. Here, the loan is provided from two days to fourteen days.

- Participants in the Notice money market are banks and related entities specified by the RBI. Scheduled commercial banks (excluding RRBs), co-operative banks (other than Land Development Banks) and Primary Dealers (PDs), are permitted to participate in call/notice money market both as borrowers and lenders. As per the new regulations, Payment Banks are also allowed to participate in CMM as both lenders and borrowers.
- Banks are the dominant participants hence it is often known as interbank notice money market. Surplus banks will give loans to other banks. Deficit banks that need funds will purchase it.

TERM Money

- The Transaction tenor varies from 15 days to 1 year.

Collateralised Borrowing and Lending obligation(CBLO)

- CBLO is a money market instrument that represents an obligation between a borrower and a lender.
- The instrument works like a bond where the lender buys the CBLO and a borrower sells the money market instrument with interest.
- The term, the interest rate, and the specifics of the CBLO are often all negotiable between the two parties.
- A CBLO is much like a Treasury bill or very short term market instrument the primary difference is a CBLO entails collateral in the transaction.

CBLO

- CBLOs may exist around the world, though they are most common in India. In that context, CBLOs are operated by the Clearing Corporation of India Ltd. (CCIL) and the Reserve Bank of India (RBI).
- CBLOs allow short-term loans to be secured by financial institutions, helping to cover their transactions. To access these funds, the institution must provide eligible securities as collateral such as Treasury Bills that are at least six months from maturity.
- The CBLO facilitates borrowing and lending for various maturities, from overnight to a maximum of one year,

CBLO

- Types of financial institutions eligible for CBLO membership include insurance firms, mutual funds, nationalized banks, private banks, pension funds, and private dealers.
- To borrow, members must open a Constituent SGL (CSGL) account with the CCIL, which is used to deposit the collateral.

Interest Rate on CBLO

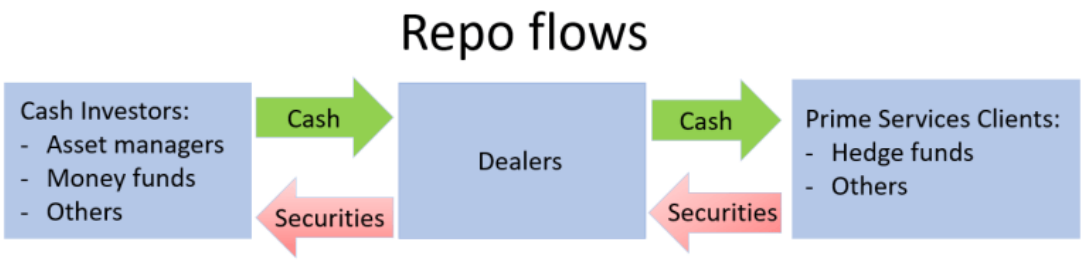
- **The creditworthiness of the borrower**- Borrowers with stronger credit histories may be able to secure funds at a lower rate.
- **Market interest rates.** The prevailing rates mostly established by short-term government securities often set the general direction of rates.
- **The competitiveness of issuance.** CBLOs may be issued through a competitive bidding process where multiple borrowers bid to secure funds from lenders. In such cases, the interest rate is determined by the lowest bid that fulfills the lender's requirements.
- **Relevant reference rates.** Some CBLOs may use reference rates, such as a benchmark government security yield, as a basis for setting the interest rate. The rate may be quoted as a spread above or below this reference rate.
- **The specific agreement.** Once the borrower and lender agree on the interest rate, it is specified in the CBLO documentation, along with other terms and condition
- CBLOs are often tradable in the secondary market, which adds to their liquidity. Investors who hold CBLOs can buy or sell them before their maturity date, allowing them to manage their investments more effectively based on changing market conditions.

Repo in Corporates bonds

- Repo is a money market instrument, which enables collateralised short-term borrowing and lending through sale/purchase operations in debt instruments.
- Under a repo transacion, a holder of securities sells them to an investor with an agreement to repurchase at a pre-determined date and rate.
- In the case of a repo, the forward clean price of the bonds is set in advance at a level which is different from the spot clean price by adjusting the difference between repo interest and coupon earned on the security.
- Repo is also called a ready forward transaction as it is a means of funding by selling a security held on a spot (ready) basis and repurchasing the same on a forward basis.

Repurchase Agreements (Repos)

- As in the case of other instruments, repos also help equilibrating between demand and supply of short-term funds.
- RBI has been using its repo instrument effectively for absorbing excess liquidity and for infusing funds to ease the liquidity



Refinance from Reserve Bank of India

- Rediscount/Refinance is used by central banks to relieve liquidity shortages in the system, control monetary and credit conditions and direct credit to selective sectors.

RBI Liquidity operations tools

- **Repo rate-**
- **Reverse repo rate-**.

- **Marginal Standing Facility (MSF)-** is the facility under which scheduled commercial banks can borrow additional amount of overnight money from the RBI at a penal rate against eligible securities. Banks are allowed to dip into their Statutory Liquidity Ratio (SLR) portfolio to borrow funds under this facility up to a limit decided by the RBI. This provides a safety valve against unanticipated liquidity shocks to the banking system

LAF

- A liquidity adjustment facility (LAF) is a monetary policy tool used in India by the Reserve Bank of India or RBI.
- The RBI introduced the LAF as part of the outcome of the Narasimham Committee on Banking Sector Reforms of 1998.
- LAF's help the RBI manage liquidity and provide economic stability by offering banks the opportunity to borrow money through repurchase agreements or repos or to make loans to the RBI via reverse repo agreements.
- LAF’s can manage inflation in the economy by increasing and reducing the money supply.
- Daily limit for repo borrowing is 0.25% of the NDT

Liquidity Adjustment Facility

- It enables the RBI to modulate short-term liquidity under varied financial market conditions to ensure stable conditions in the overnight (call) money market.

- The LAF operates through daily repo and reverse repo auctions thereby setting a corridor for the short-term interest rate consistent with policy objectives.

MSF

- The Marginal Standing Facility (MSF) is an overnight liquidity support scheme by the RBI to provide funds (liquidity injection) to commercial banks with a higher interest rate over the repo rate.

- Basically, the MSF is an emergency liquidity facility and is available on all working days and on most of the holidays. MSF can be used by a bank even if it exhausts its eligible security holdings for borrowing under other options like the LAF repo.

Standing Deposit Facility

- The opposite purpose of liquidity absorption (parking funds with the RBI).
- The phasing out of Repo and Reverse Repo operations by the RBI have increased the significance of MSF and SDF for the respective purposes of liquidity injection and absorption respectively

RBI Liquidity operations tools (Revision)

- **Corridor-** is determined by the MSF rate as ceiling and reverse repo rate as the floor of the corridor for the daily movement in the weighted average call money rate.

- **Bank rate-** is the standard rate at which the RBI is prepared to buy or rediscount bills of exchange or other commercial papers eligible for purchase under the Reserve Bank of India Act, 1934.

- **Cash Reserve Ratio (CRR)-**is the minimum cash balance that a scheduled commercial bank is required to maintain with the RBI as a certain percentage of its net demand and time liabilities (NDTL) relating to the second preceding fortnight.

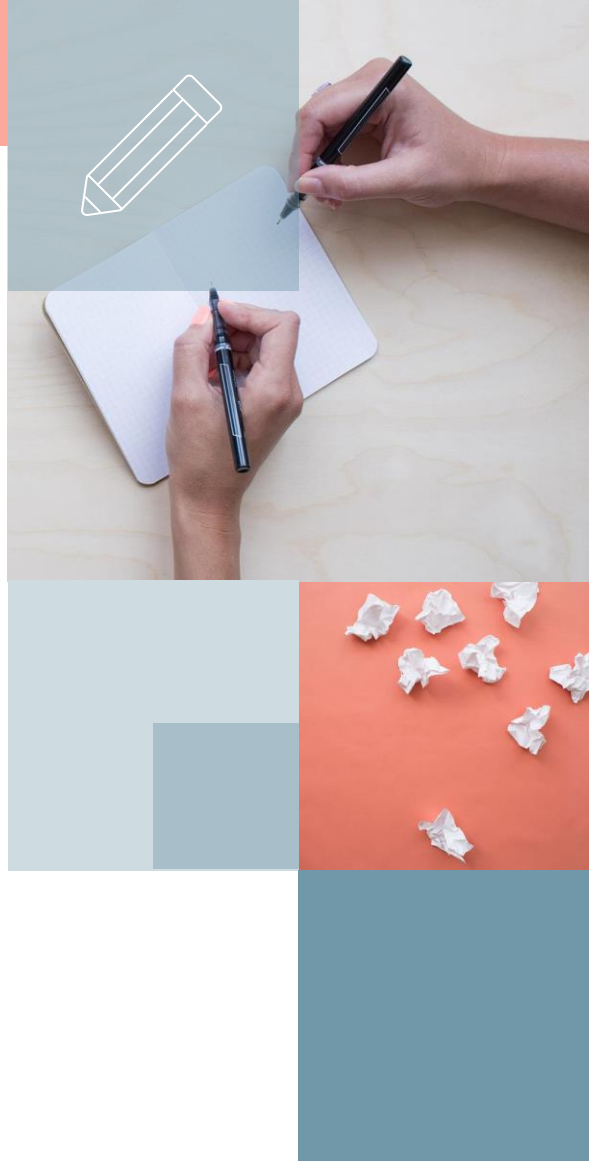
- **Statutory Liquidity Ratio (SLR)**- is the share of NDTL that the scheduled commercial banks are required to maintain on a daily basis in safe and liquid assets, such as unencumbered government securities and other approved securities, cash and gold

Temp. Open Market Operations

- CB May lend securities against cash.(Increases rates)
- CB lend cash against securities(Decreases interest rates)
- Term of temporary operations is typically overnight or few days.
- They are Repo options. Goal is to adjust level of money supply so as to keep the short -term interest rates close to the announce target rates.
- In 2020 Fed Injected 7.75 billion of cash against (T-bills, MBS).

Repo Auctions

- It allows central bank to monitor and act on a daily basis as needed to respond to the demand for reserves in the economy and keep short term Interest rates at the desired level.



Discount Windows

- CB lends funds to Depository institutions “As a lender of last resort”
- It plays complementary role to open market operations.
- It is best thought of as a safety valve to relieve pressure in markets,
- “Fed lend 45.5bn to DP’s on September 2001.
- Normally rate is lower than repo in market.

Federal fund Action in 2007-2008

- The ability of Fed to supply enough reserves and maintain its desired objective depends upon how crucially “money market functions”.

- What happened in 2007???????

2007 Crisis case

In 2007 Mortgage market experience Breakdown.

This caused many banks to take write downs in Mortgage related position. And short up their capital and liquidity by issuing equity and curtailing lending.

Banks curtailed lending in Interbank market because they were not sure of exposure of other participants.

Hence interest rates in Inter- bank markets increased dramatically relative to target fed-fund rates.

What Fed did to stabalize

- Hence interest rates in Inter- bank markets increased dramatically relative to target fed-fund rates.

On Fed Acknowledged that banks were experiencing unused funding need.

Fed Cut discount rate with 50 BPS on August 17, 2007

It made borrowing at discount windows only 50 BPS more expensive than federal fund rate.

Hence interest rates in Inter- bank markets increased dramatically relative to target fed-fund rates.

Fed announced new lending program to provide credit to other wall street firms and increase maturity to 90 days from 30 days.

View Point on 2024
Debt Market Scenario

- Life knows two miseries-getting what you want and not getting what you want.

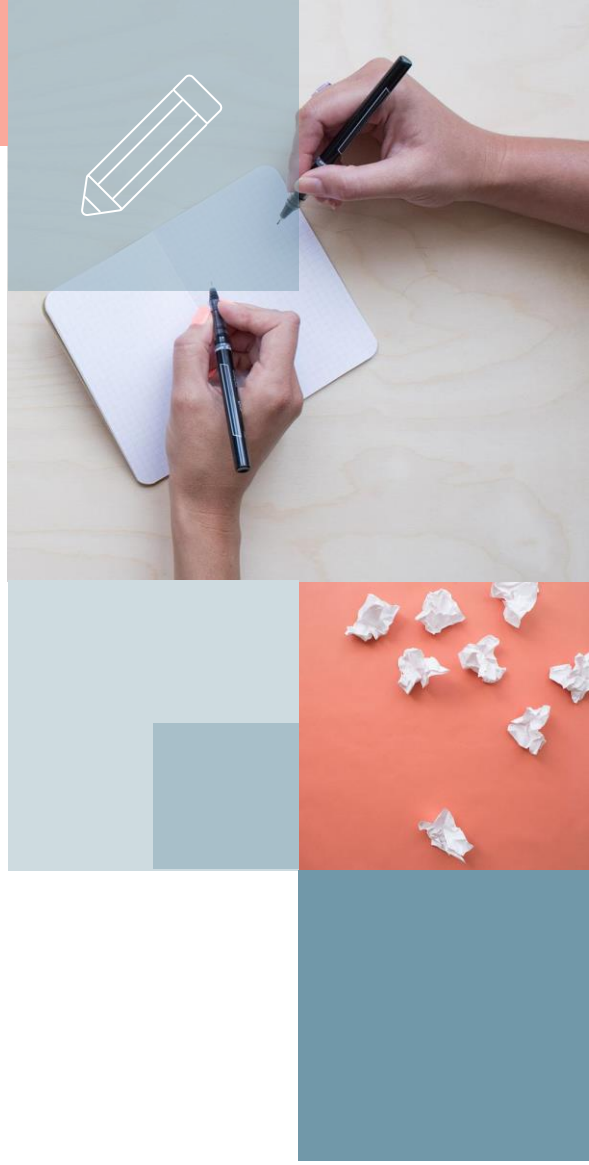
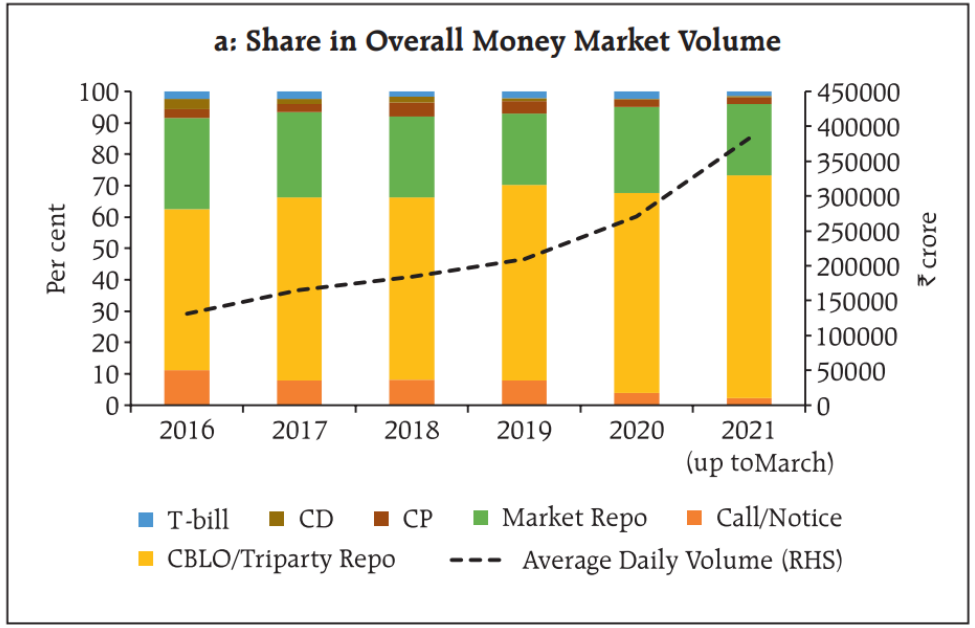
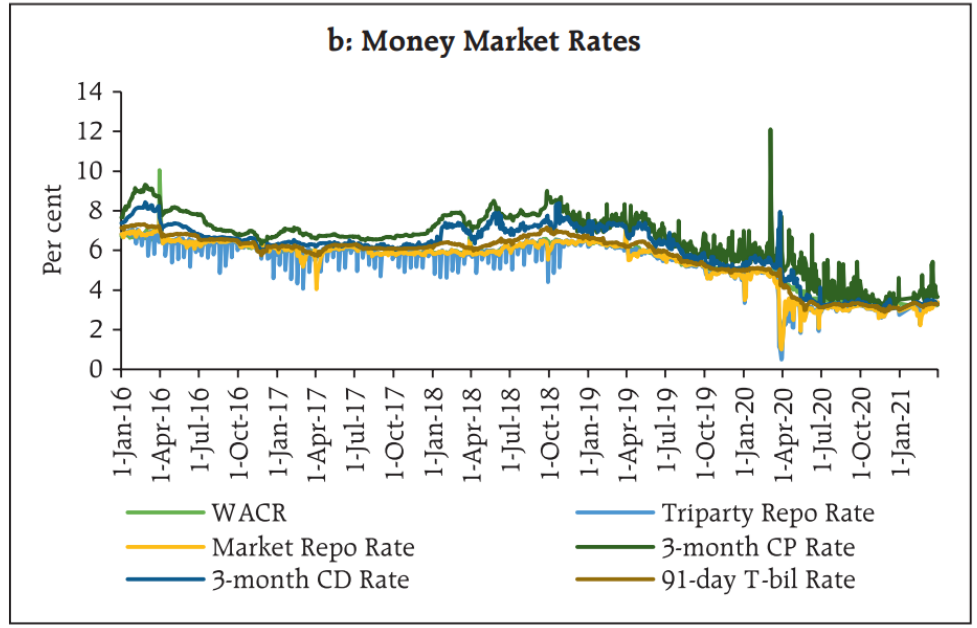
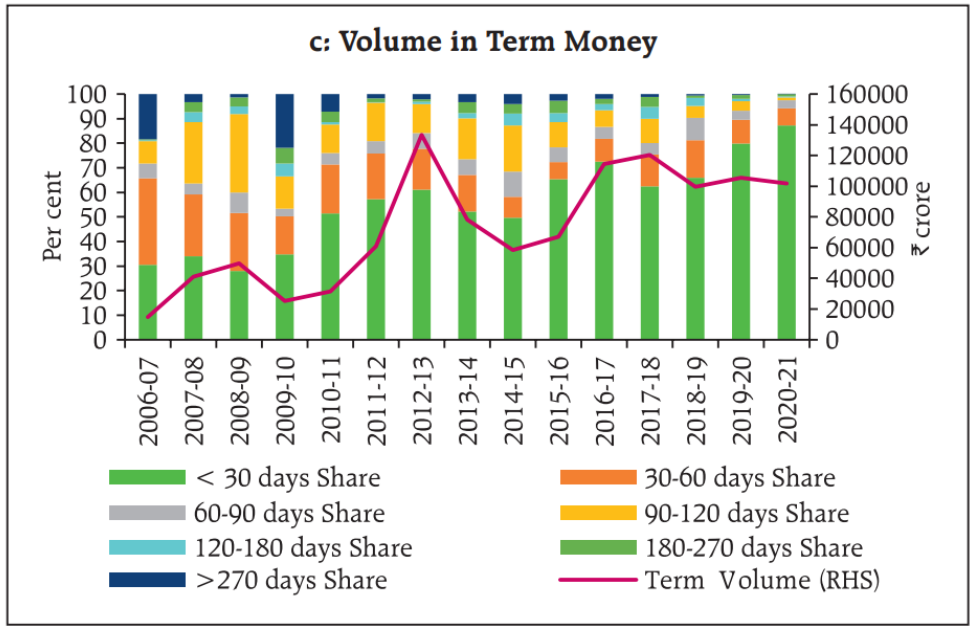
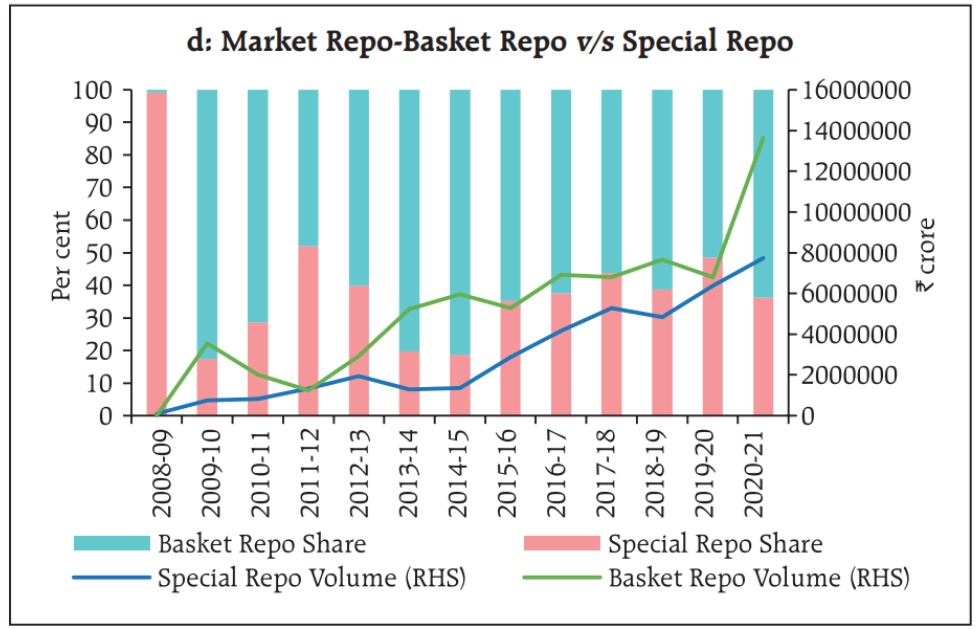


Chart 1: Overview of the Indian Money Market









Note: Weighted average call rate (WACR) is the volume-weighted average rate of the call/notice segment.
Sources: RBI; CCIL; FBIL; NSDL; FIMMDA; and Author's calculations.

Issuance of G-Sec and T-Bill

- Every participant of the auction process should be a member of RBI by opening subsidiary general Ledger(SGL) account with RBI. It keeps securities in dematerialised form.
- One has to open a current account and subsidiary account.
- They place their bids directly through E-Platform.
- Non-Member can place bid through member of RBI (Gilt Account).

Auction process of T-bills and G-secs

- RBI publishes half yearly G-secs calendar.
- When issued trading.
- Auction mechanism can be competitive bid and non-competitive bid.

Auction process of T-bills and G-secs

Announcement

When Issued Trading- trading starts in the security from the announcement

Auction Mechanism- RBI conducts auction through e-platform Kuber, Bids can be placed by investment bankers by competitive bids and retail investors by non-competitive bidding (Through a facilitator like BSE)

Allotment Mechanism-Market based price discovery.

Allotment Mechanism

- Yield based(new issue) and Price based(re-issue).

- Suppose RBI came up with 4000 cr of G-sec for issuance.

S. No.	Bid	Bid Amount	Total
1	7.21	1500	1500
2	7.23	1000	2500
3	7.24	1000	3500
4	7.26	500	4000
5	7.30	500	4500

Was auction good??

- 4500/4000=1.125
- Tail= (7.26-7.235) (Highest yield – Average of acceptable yield)lower tail indicates the strength.
- Lower tail indicates strength.
- Auction detail provide demand for the bond.

Auction can be:

- **Uniform Price-** All successful bids are required to pay at the same price/yield irrespective of the yield/ price that they bid.
- **Multiple price** auction- Bidders pay whatever they bid.

Role of PD in issuance of G-secs.

- They participate in primary auction of G-secs.
- Currently there are 7-standalone and 11 banks acting as PD's.
- When G-secs are not fully subscribed PD purchase the unsubscribed.
- Successful PD are advised to make payment on settlement day, T+1 system is followed. CCIL is one for clearing.

Issuance of Corporate Bond

- NSE/BSE has launched EBP.
- Public issue of Corporate bond is listed and traded in capital markets of NSE.
- Private placement happens on WDM(wholesale debt market).

How Bonds are traded

- Market order
- Limit order
- Stop loss order

- Validity Instructions
- Day order
- Good-till cancel
- Immediate or Cancel order.

E-platform to buy G-secs

- OTC/ Telephonic market.
- Negotiated dealing system.
- NSE WDM and RDM segment.

How policy rates impacts Prices in economy

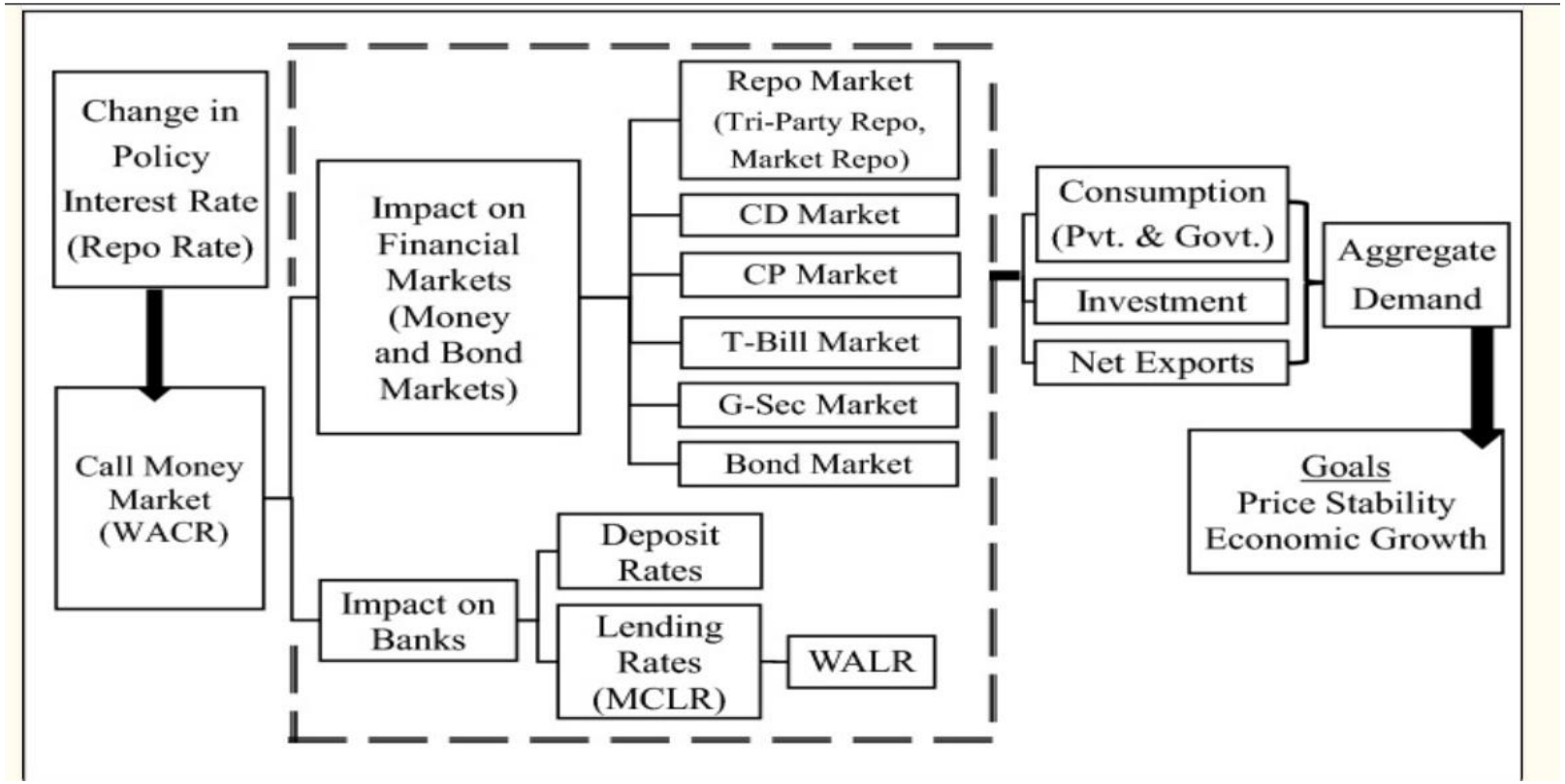
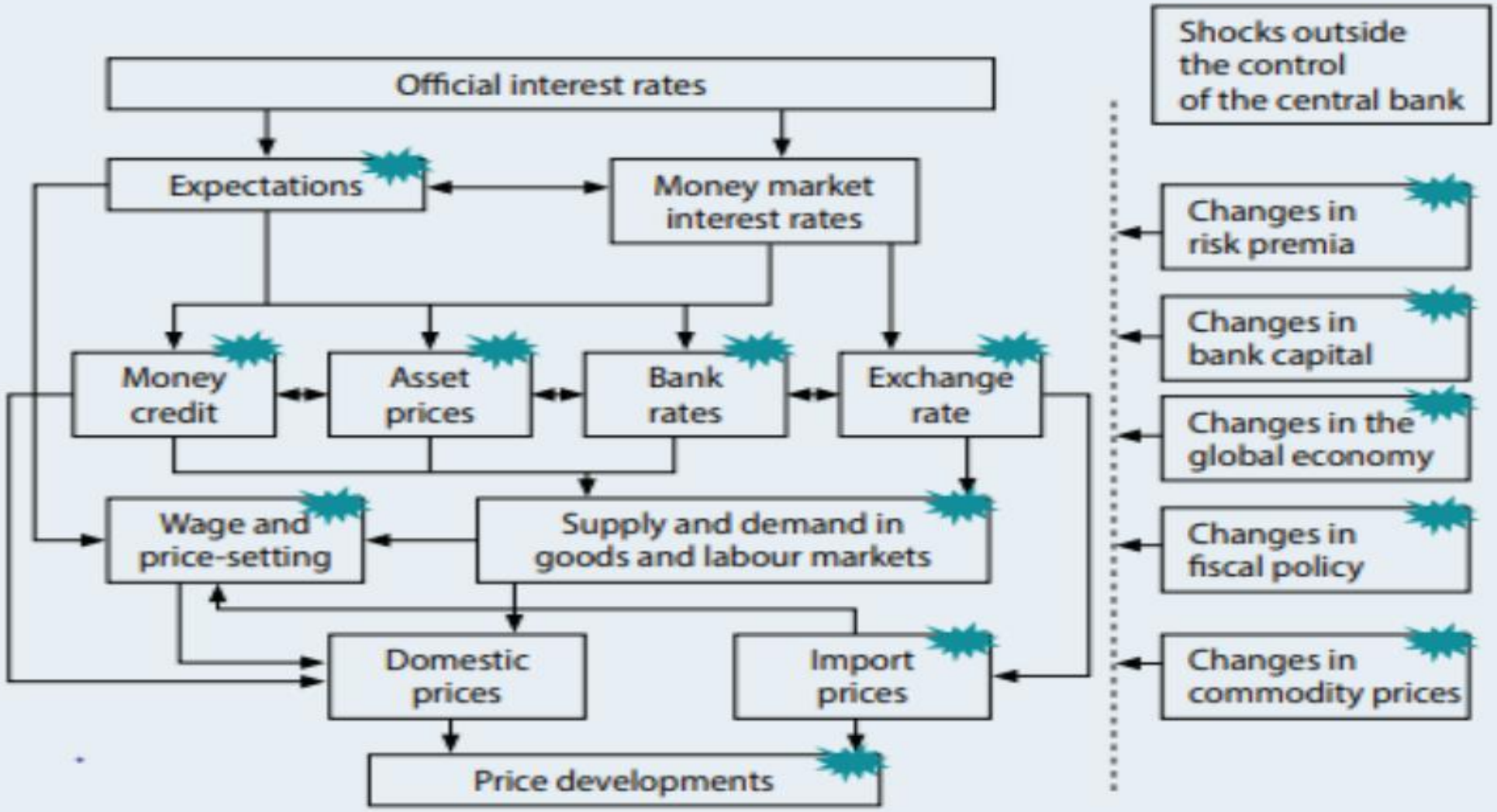


Chart I.29: Impact of Climate Risk on Monetary Transmission



denotes channels which could be impacted directly or indirectly by physical or transition risks.

Source: NGFS (2020).

Summary

- Central bank buy and sell securities to regulate money supply in economy.
- Secondly, central bank buy and sell foreign currency to regulate interest rate.

- **Increase money supply----- buy Government Securities – reduce inflation**

Budget Deficit and Central Bank

- If government of India has high budget deficit it means it is spending a lot.
- This will boost demand (and inflationary situation)
- RBI in this case curb money supply by increasing rates.
- RBI may increase repo and reverso in case of more than targeted budget deficit.

RBI and Foreign Exchange Market

- If USD is appreciating with respect to INR.
- RBI may sell USD(this leads to supply of USD and demand of INR)

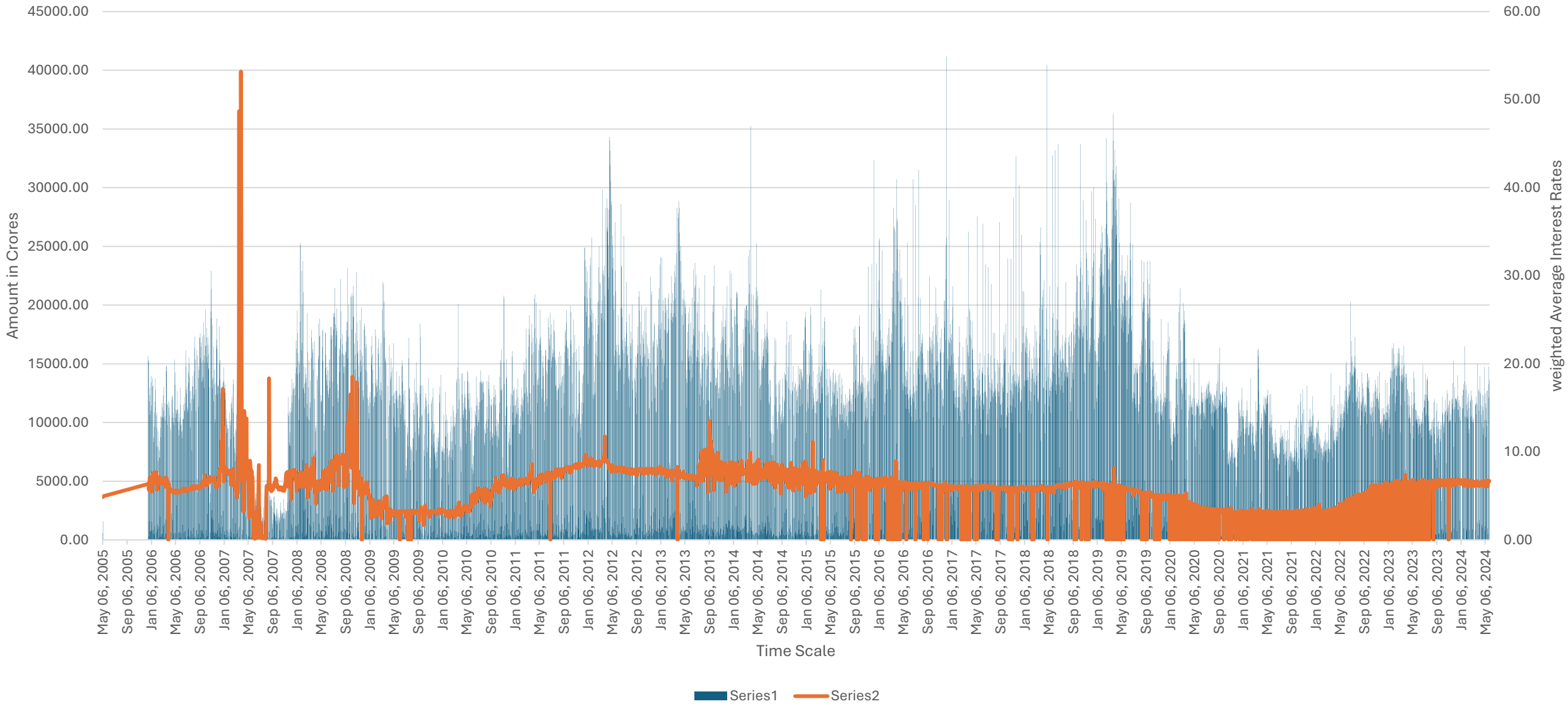
Sterilized and Unsterilized Intervention

- If RBI were to buy or sell foreign currency **without a parallel** intervention in money market is Unsterilized intervention.

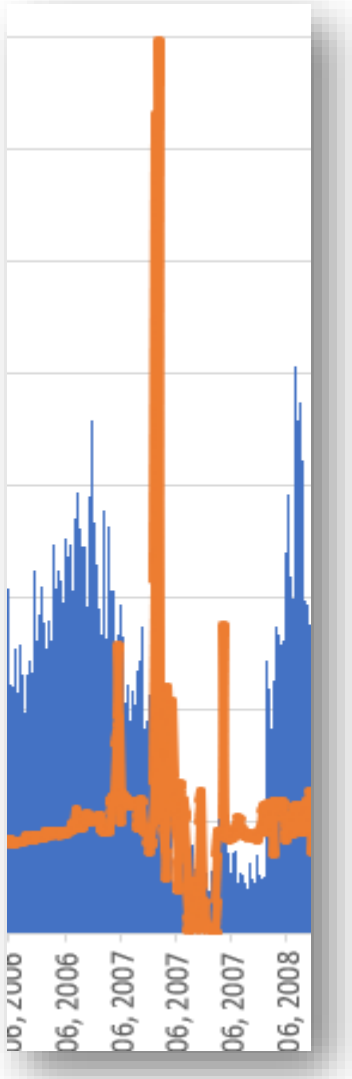
Money Market Instruments & Participants

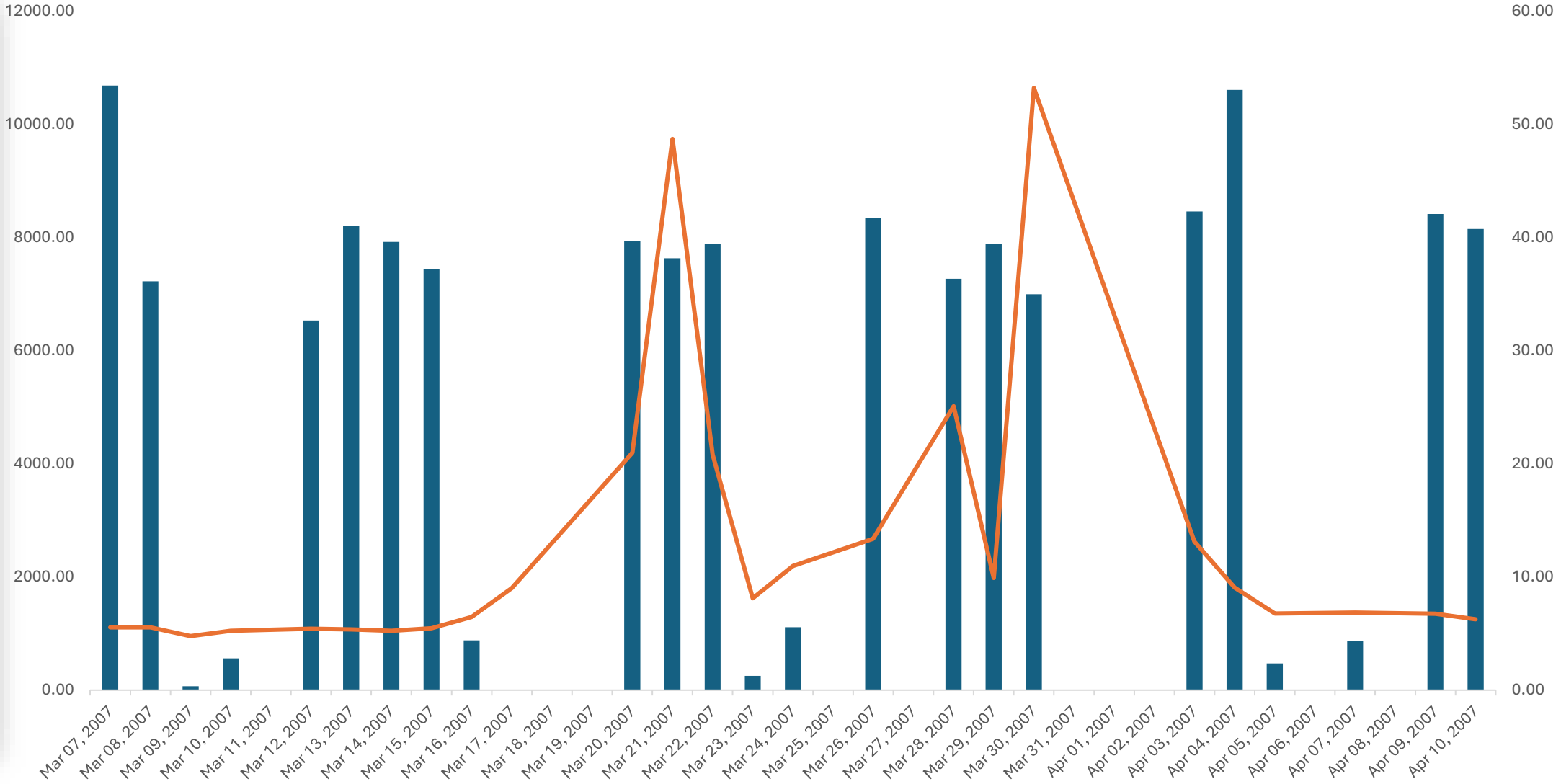
Segment	Type	Eligible Participant
Call Money	Unsecured, Interbank	SCB, small finance banks, payment banks, Regional Rural banks, Co-operative banks, PD
CBLO/Triparty Repo	Collateralised borrowing(eligible collateral :G-sec, T-bills)	SCB, Co-operative banks, PD, FI, Insurance companies, MF, NBFC, corporates, provident/pension funds
Market Repo	Collateralised borrowing, CCIL provide guarantee of settlement of all deals	SCB, Co-operative banks, PD, FI, Insurance companies, MF, NBFC, corporates, provident/pension funds Listed and unlisted companies
Commercial papers	Unsecured, issued as promissory note	Companies, All India Fin Institutions
Certificate of deposits	Unsecured, Negotiable	SCB, All India Fin Institutions
T-bills	Issued by GoI	GoI, SCB
G-Sec	Issued by GoI	GoI, SCB

Call Money Amount and Interest Rate

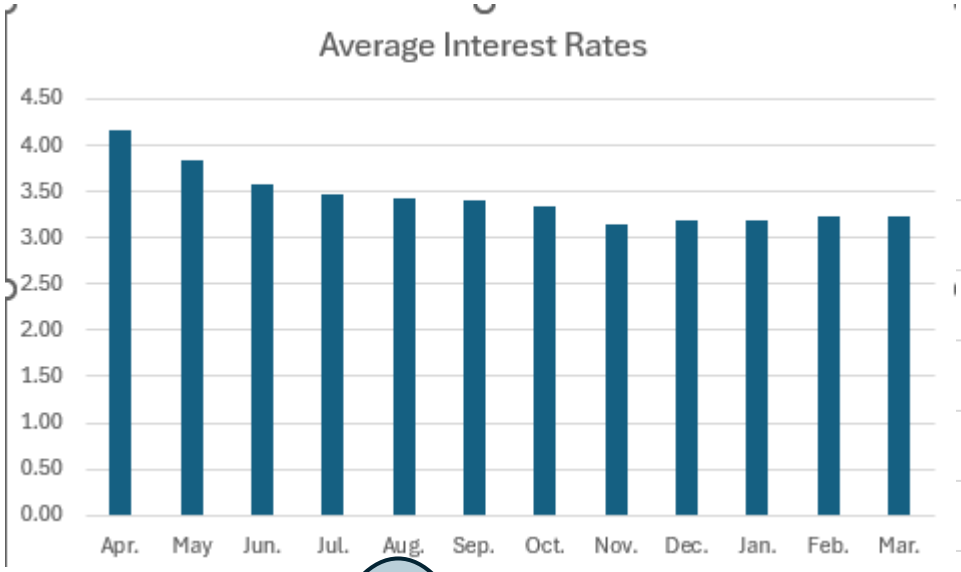


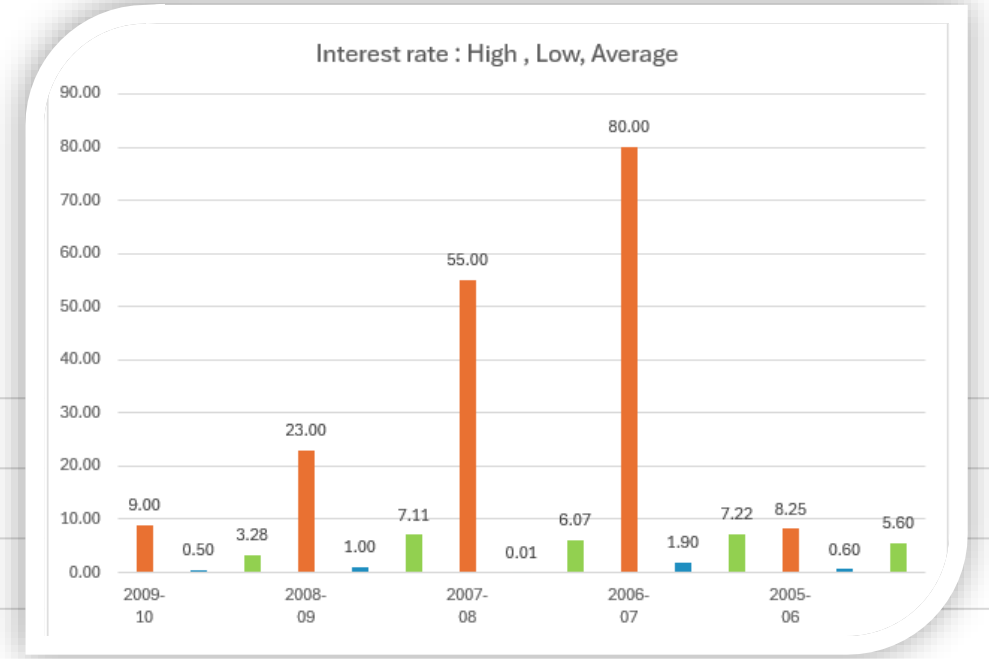
Call Money Amount and Interest Rate

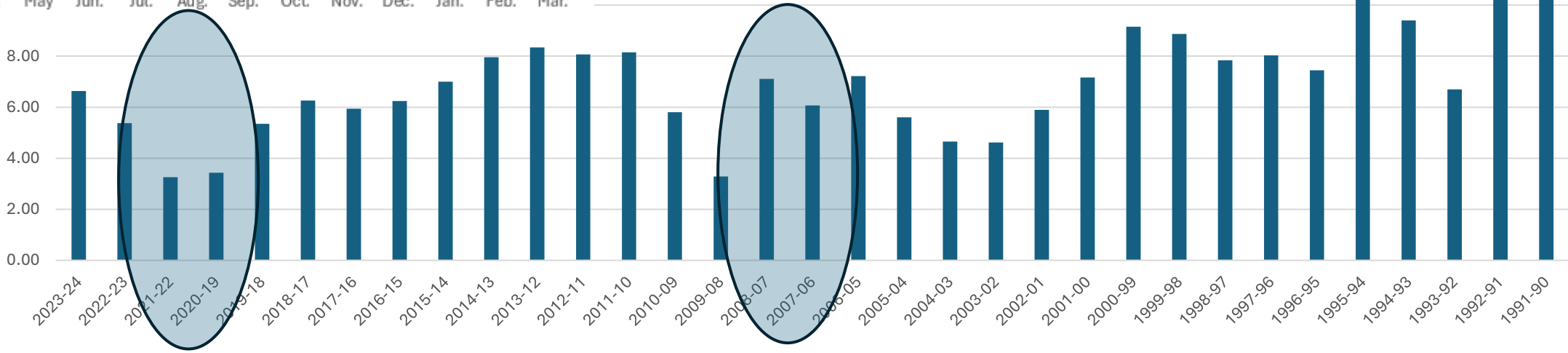




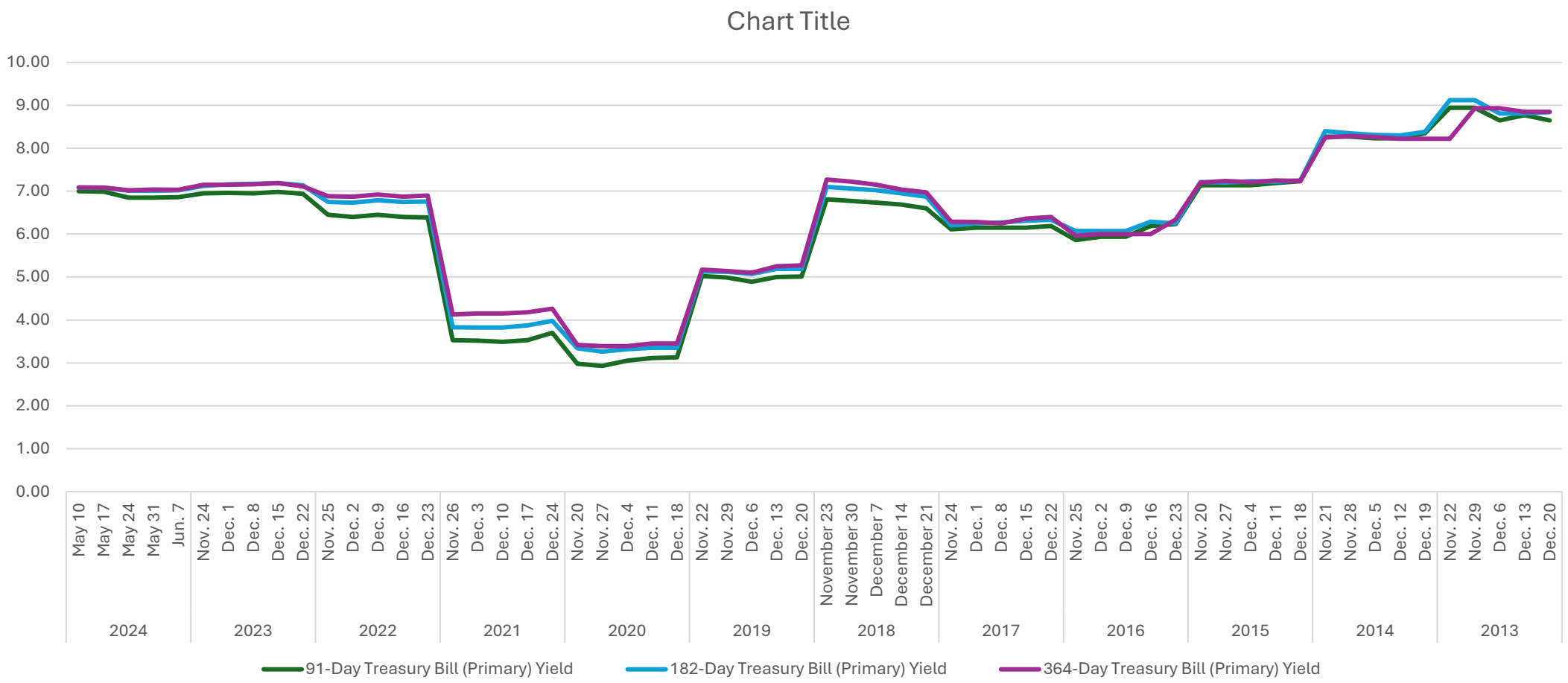
Weighted Average Interest Rate



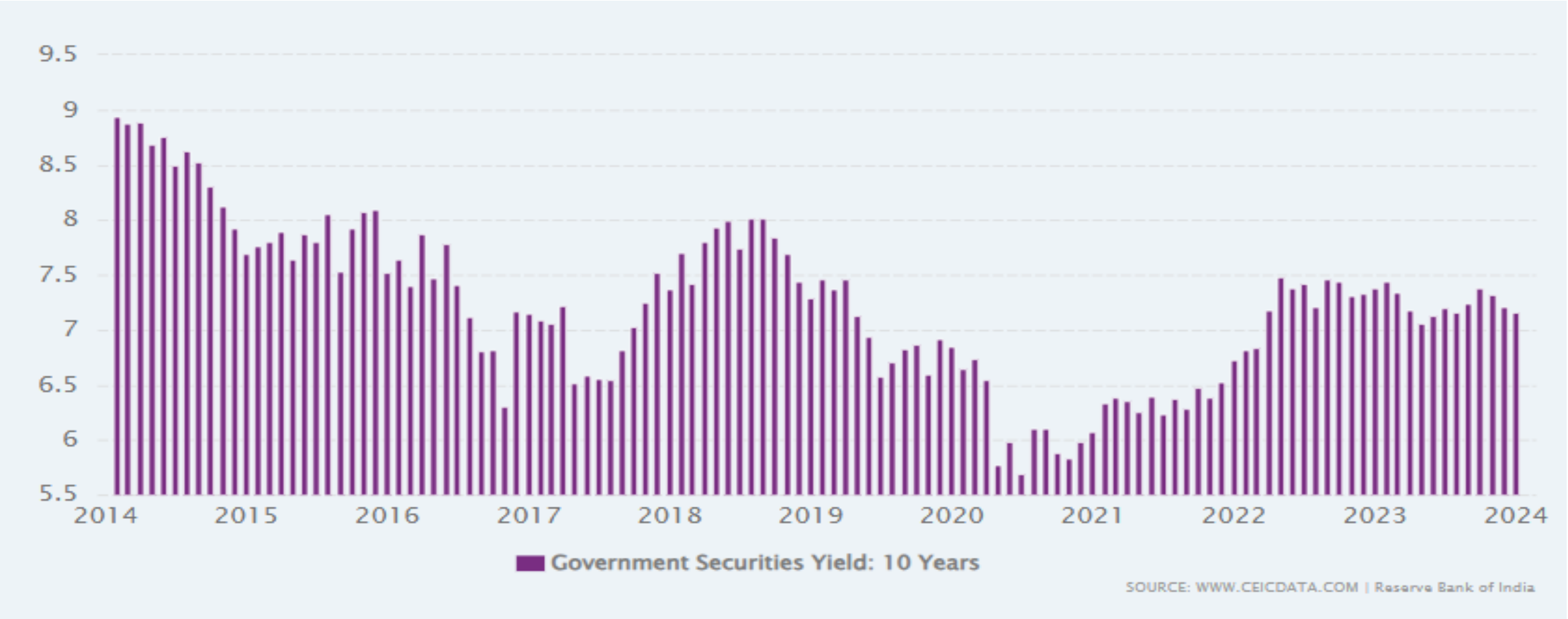




T-bill Yields



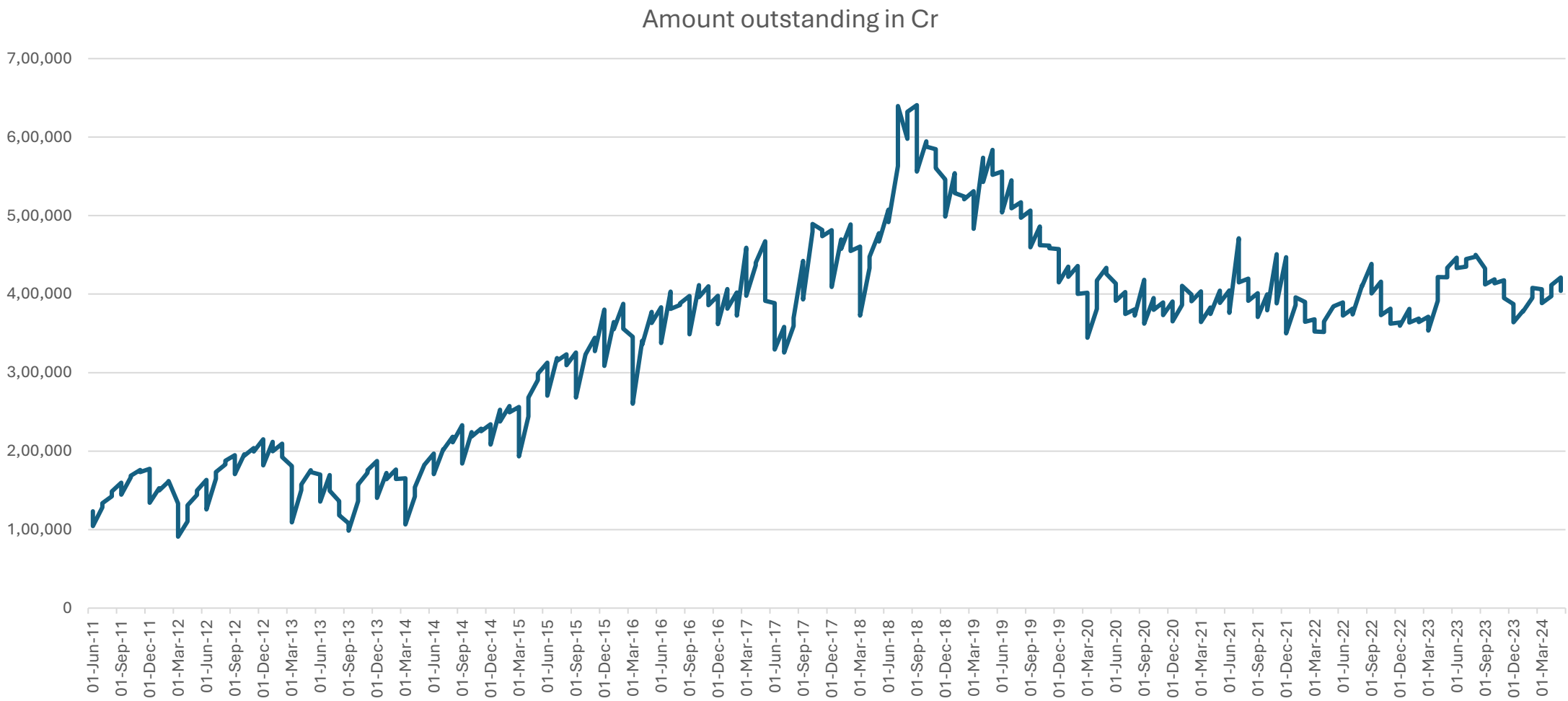
Govt Securities



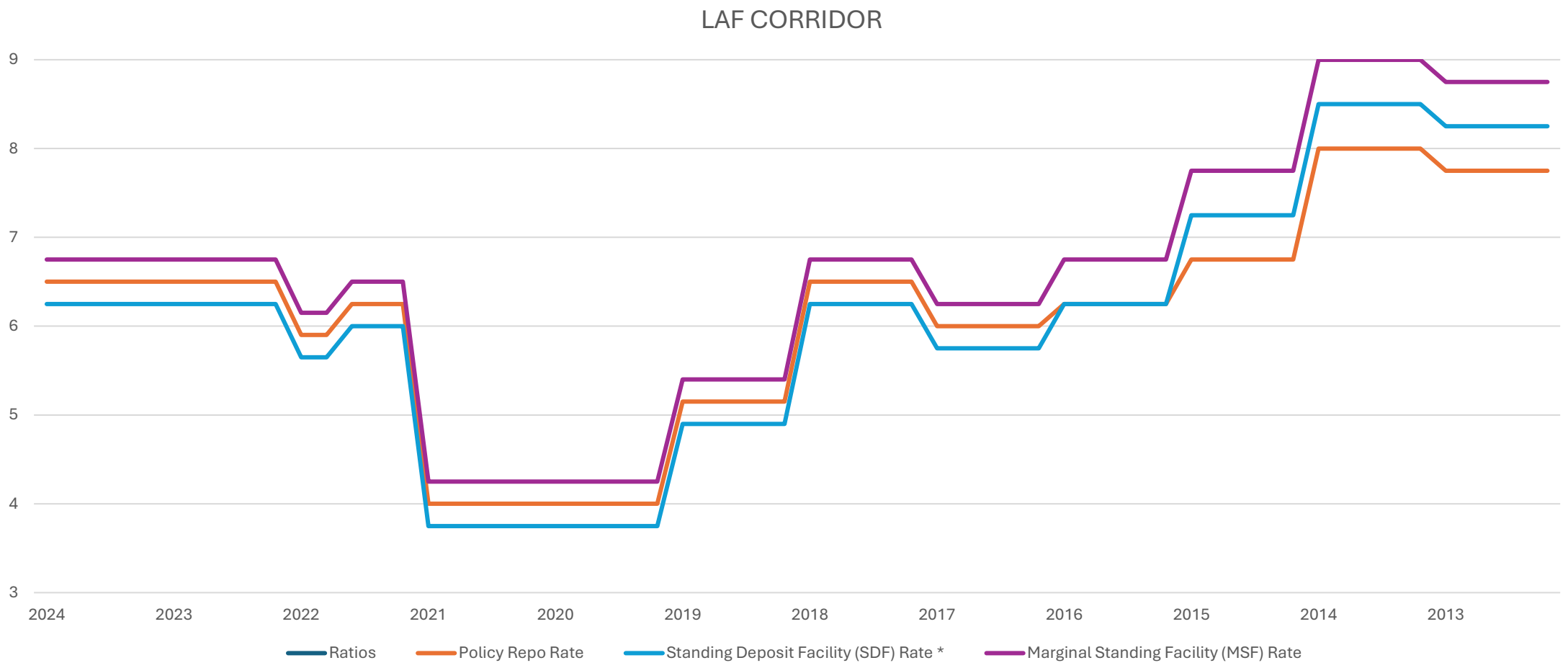
Certificates of Deposit

- CDs are short-term borrowings in the form of UPN issued by all scheduled banks and are freely transferable by endorsement and delivery.
- Introduced in 1989
- Maturity of not less than 7 days and maximum up to a year. FIs are allowed to issue CDs for a period between 1 year and up to 3 years
- Subject to payment of stamp duty under the Indian Stamp Act, 1899
- Issued to individuals, corporations, trusts, funds and associations
- They are issued at a discount rate freely determined by the market/investors

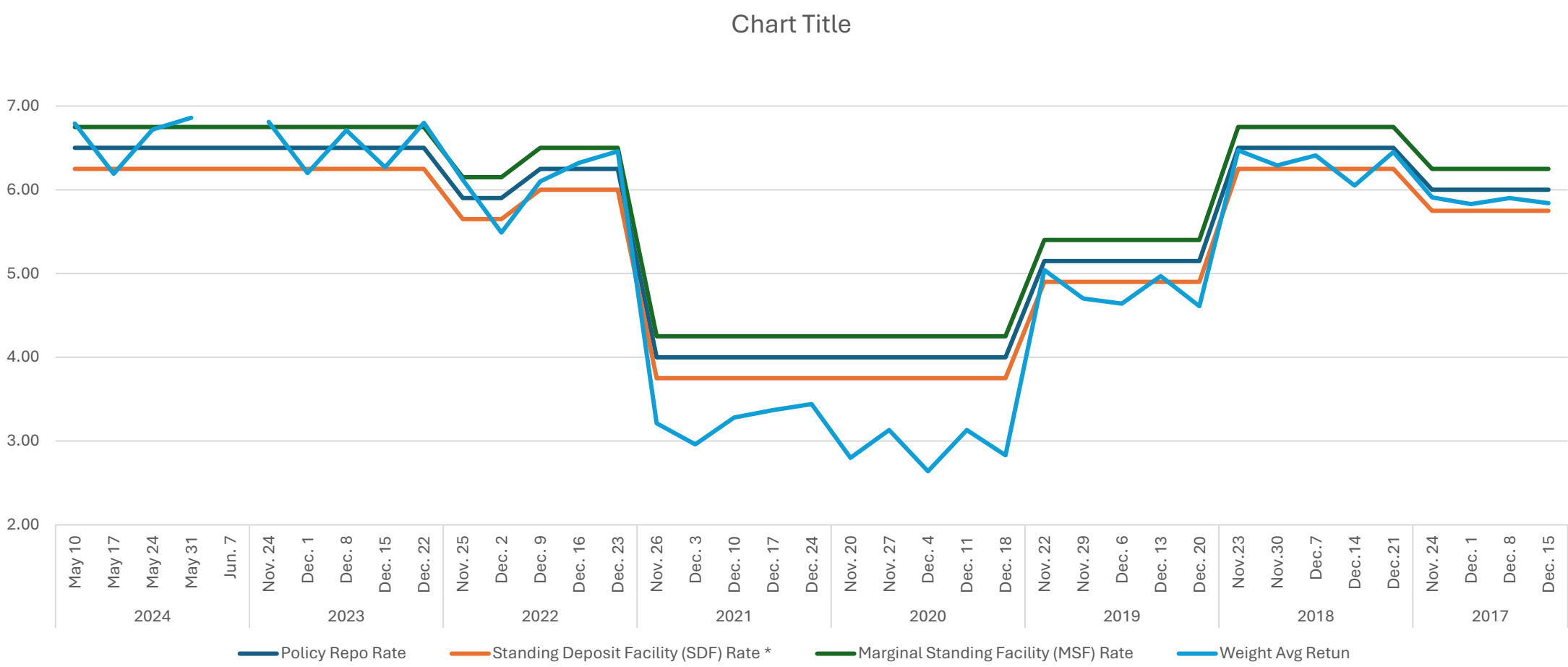
20 yr Profile : Commercial Papers



LAF CORRIDOR



LAF CORRIDOR AND CALL MKT RATE



Derivatives in India

ETPrime

Desperate retail investors drive India's options craze

By Andy Mukherjee, Bloomberg • Last Updated: Dec 12, 2023, 10:12:52 AM IST

FOLLOW US SHARE FONT SIZE SAV

Synopsis

The Securities and Exchange Board of India's crackdown on social-media influencers peddling advice is a losing battle. Although nine out of 10 individual traders are losing money, retail investors can't get enough of derivatives. A smartphone-led gamification of investing is complete.

It is especially worrying in India, where trading in futures and options is now more than 400 times bigger than the underlying cash-market turnover

Cash / Spot Market

- In a Cash/Spot market, the three components of any transaction

✓ **Price Negotiation ;**

✓ **Clearing** (*Determination of funds & asset obligations of each party*), &

✓ **Settlement** (*Exchange of respective obligations*)

takes place with ***'no' or ' with minimal delay'*** (on the spot).

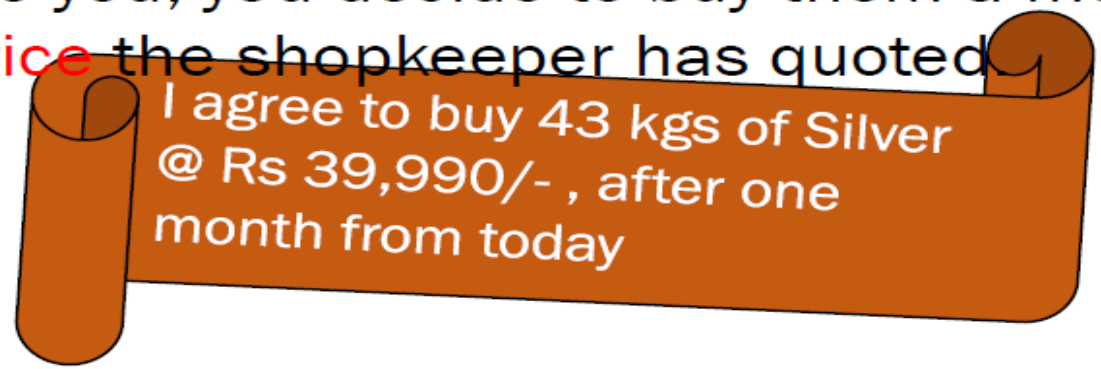
Suppose you wish to buy 43 kgs of Silver today.

- ✓ Enquire about the price of the Silver.
- ✓ The shopkeeper informs that it will cost Rs.37,870/- per kg of Silver.
- ✓ If the price is agreeable to you, you decide to buy.
- ✓ Shopkeeper then calculates how much you have to pay and set aside 43 kgs of Silver.
- ✓ You pay Rs. 16,28,410/- and take delivery of 43 kgs of Silver.

Forward Market

Now, suppose you wish to buy 43 kgs of Silver ***after one month****, instead of today.*

- ✓ You tell the store owner that you want to buy 43 kgs of Silver, ***a month later***.
- ✓ The shopkeeper informs that it will cost Rs. 39,990/- per kg of Silver.
- ✓ If the price is agreeable to you, you decide to buy them a month later at the one-month price the shopkeeper has quoted.



- ✓ *One month later*, you pay Rs 17,19,570/- and take delivery of 43 kgs of Silver.

This is a Forward contract entered into in the Forward market.

Forward Contract

Today — After One Month

Buyer buys a Forward Contract (or goes long) on Silver.
No amount changes hands today.

Buyer pays Rs.17,91,570/- to the Seller, who delivers to the buyer of the Forward contract, 43 kgs of Silver.

- If the price is less than Rs. 39,990/-per kg, the buyer will make a loss.
- If the price is more than Rs. 39,990/-per kg, the buyer will make a profit.

If the Spot price moves up.....

- Pay-off (or Profit) from a Long position in the Forward Contract is: **Spot Price on Maturity (S_T) *less* Forward Price (F_o)**

Pay-offs = profit/loss from the forward contract, as it costs nothing to enter into a Forward contract.

If the Spot price moves down.....

- Pay-off from a Short position in the Forward Contract is:
  Forward Price (F_o) *less* Spot Price on Maturity (S_T)

Futures Exchanges in India

Futures Exchange	Futures Contracts
National Stock Exchange (NSE) www.nseindia.com	• Equity Index Futures • Single Stock Futures • Currency Futures • Interest Rate Futures • VIX Futures
Bombay Stock Exchange (BSE) www.bseindia.com	• Equity Index Futures • Single Stock Futures • Currency Futures • Interest Rate Futures
Metropolitan Stock Exchange of India (MSEI) www.msei.in	• Equity Index Futures • Single Stock Futures • Currency Futures • Interest Rate Futures

Futures Exchanges in India

Futures Exchange	Futures Contracts
National Commodity & Derivatives Exchanges Ltd (NCDEX) www.ncdex.com	• Cereals& Pulses: Bajara, Barley, Chana, Mazie, Wheat • Oil & Oil seeds: Castor seeds, Cotton seeds, Soyabean, Refined Soy Oil, Mustard Seed, Crude Palm Oil. • Fibres: Kapas, Cotton • Soft: Sugar, Gur • Guar Complex: Guar Seed & Gum • Spices: Pepper, Turmeric, Jeera, Chilli, Coriander • Plantation Products: Rubber • Others: Potato • Metals: Steel, Copper • Precious Metals: Gold, Silver • Energy: Crude Oil, Brent Crude Oil.

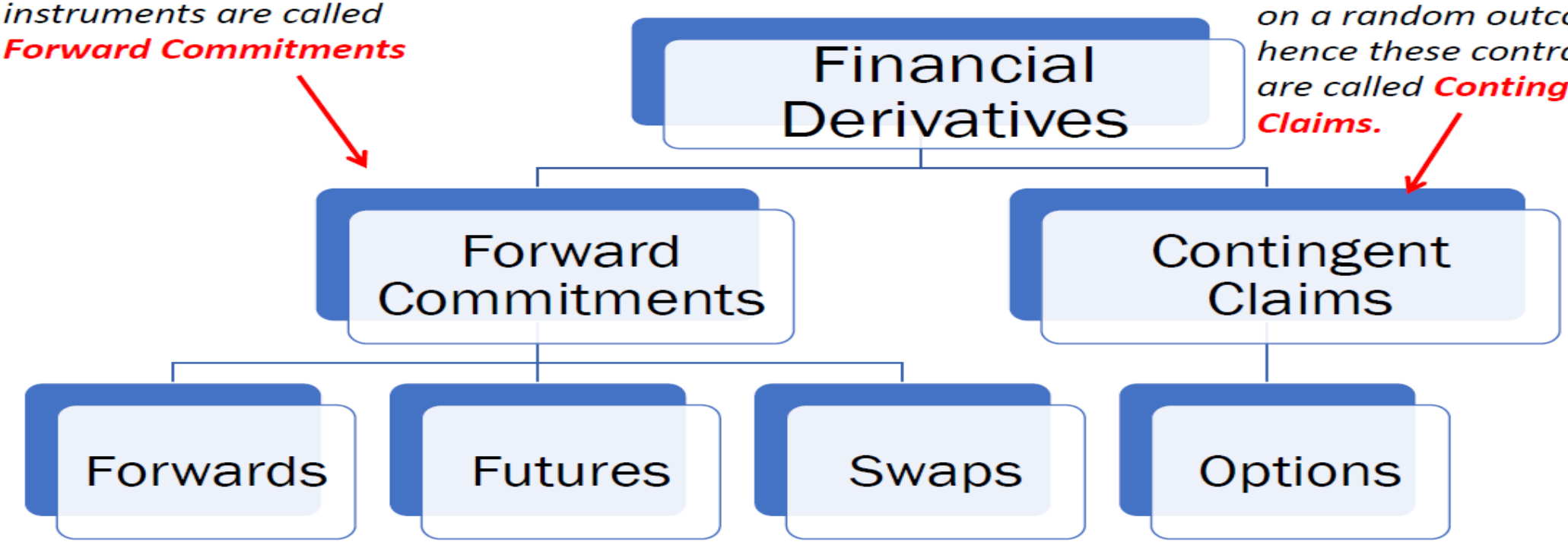
Futures Exchanges in India

Futures Exchange	Futures Contracts
National Multi Commodity Exchange of India Limited (NMCE) www.nmce.com	• Oils & Oil seeds: Castor seed, Copra, Soyabean Oil, Mustard Seed, Guar Seed. • Pulses: Chana • Spices: Pepper, Cardamom • Others: Rubber, Sacking, Coffee Rep Bulk, Isabgul seed
Multi-Commodity Exchange of India Limited (MCX) www.mcxindia.com	• Bullion: Gold, Silver • Base Metals: Aluminum, Copper, Lead, Nickel, Zinc • Energy: Crude Oil, Brent Crude Oil, Natural Gas • Agro-Commodities: Cardamom, Cotton, Crude Palm Oil, Kapas, Mentha Oil

Financial Derivatives

As these contracts force the two parties to transact in the future at the pre-determined price, these instruments are called ***Forward Commitments***

As the choice of buying or selling the underlying vs. doing nothing depends upon on a random outcome, hence these contracts are called ***Contingent Claims.***



Forward Contract

- In a forward contract, the two parties ***irrevocably*** agree on the **price** and **quantity** of goods to buy/ sell today, ***but actual payment and delivery of goods takes place at a future date.***
- No exchange of goods or money takes place at the time of entering into a Forward Contract.
- Buyer of the Contract is said to have a "Long" position while the seller has a "Short" position .
- On the maturity (or expiry) date, the buyer is **obligated** to pay for the goods and take delivery and the seller is **obligated** to deliver goods and receive the payment, *irrespective of the price of the goods on the expiry date.*

Forward Contract

- Each Forward Contract is a Unique Contract, customized to the requirements of the contracting parties.
- Such contract are Over-the-Counter (OTC) products & not traded freely.
- Forward Contracts are mostly settled on maturity with the seller delivering the underlying assets and the buyer paying the specified price.

Issues with Forward Contracts

- Counterparty Risk: As Forward contracts are bilateral relationship between two parties, unfavourable price movement, may tempt one adversely affected party to declare itself bankrupt and avoid performance. →Counterparty risk.
- Illiquidity: Forward Contracts are Custom-designed and situation specific contracts, involve too much of "flexibility" which makes the contracts non-tradable. as others might not find those specific terms useful to them.
- Often, forward markets turn into small private clubs of dealers, who earn high intermediation fees.
- This makes forward markets an illiquid market.

Futures Contract

- Futures contract is an agreement to buy or sell an asset for a certain price at a certain future date.
- A Futures contract ISa forward contract, except that it is standardized and hence are traded on an Exchange.
- It is characterized by the following:
- Standardization of the Contract

Traded on Exchange means:

- Centralization of Trading
- Enhanced liquidity
- Novation by Clearinghouse
- Mark-to-Market (MTM) margining system

Standardisation of Futures Contract

- Futures Exchange specifies in detail the nature of a Futures contract, subject to regulatory approval.
- Futures contract are specified in terms of:
- Underlying asset
- Contract size
- Delivery arrangements
- Delivery month
- Price quotes
- Price & Position Limits

Underlying Asset

- In case of Commodity Futures, the Exchange stipulates the underlying assets and grade(s) that are acceptable.

✓ Silver(MCX): Grade 999, Fine 999 (as per IS2112:1981)

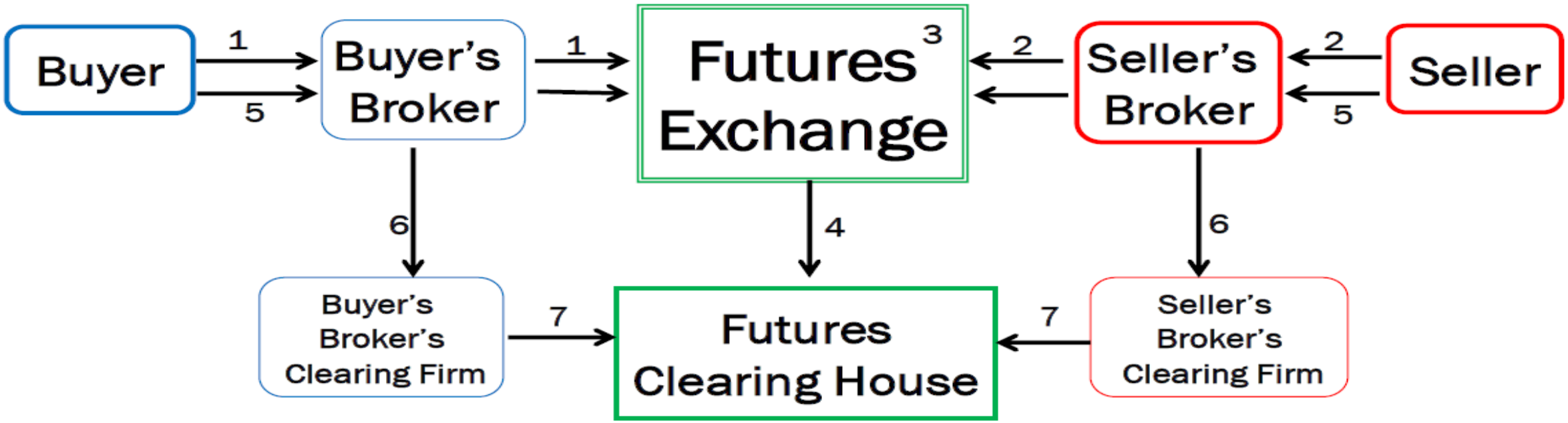
✓ Aluminum (MCX) : Min purity 99.7%

✓ Copper (MCX): Grade 1 electrolytic copper (as per B115 specification)

- For some commodities, a range of grades may be delivered with adjustment in price based on the grade delivered.
  - ❑ Standard Grade: No. 2 Yellow for Corn Futures (CME)
  - ❑ Acceptable Grade: No. 1 Yellow with 1.5 cents per bushel more or No. 3 Yellow with 1.5 cents per bushel less than No. 2 Yellow.
- In case of Financial assets - Futures contracts are well defined & unambiguous.

✓ Enough to say 'Futures on BSE Sensex' or 'Futures on Infosys'

Transaction on a Futures Exchange



1: Buyer places a BUY order with his Broker who in turn places it with the Futures Exchange.
2: Seller places a SELL order with his Broker who in turn places it with the Futures Exchange
3: Futures Exchange matches the trade through a computerized system.
4: Information about the trade is reported to the Clearing House.
5: Buyer and Seller deposit margin with their respective brokers.
6: Buyer's and Seller's Brokers deposit the margins with their respective clearing firms.
7: Clearing firms deposit the margins with the Clearing House.

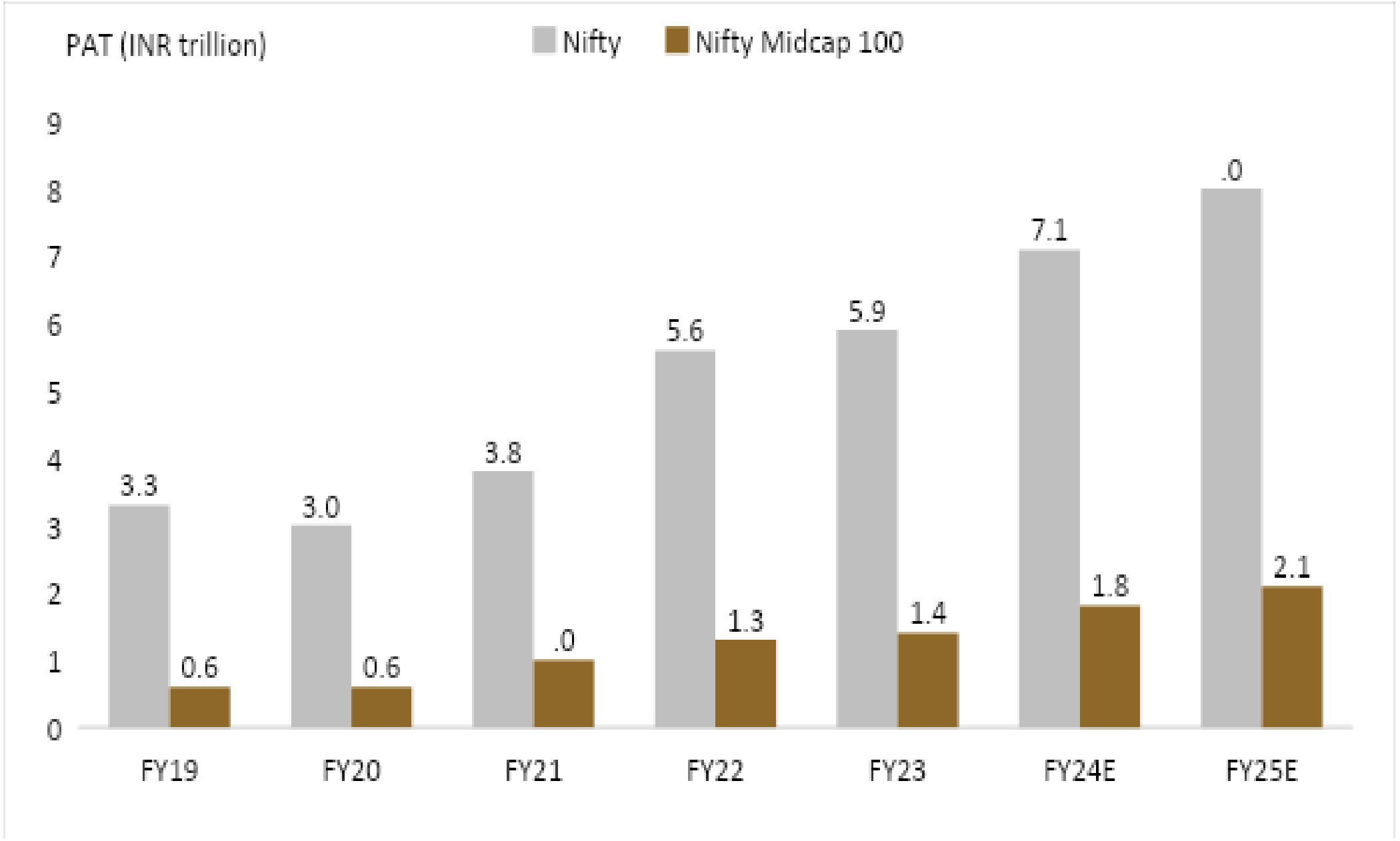
News

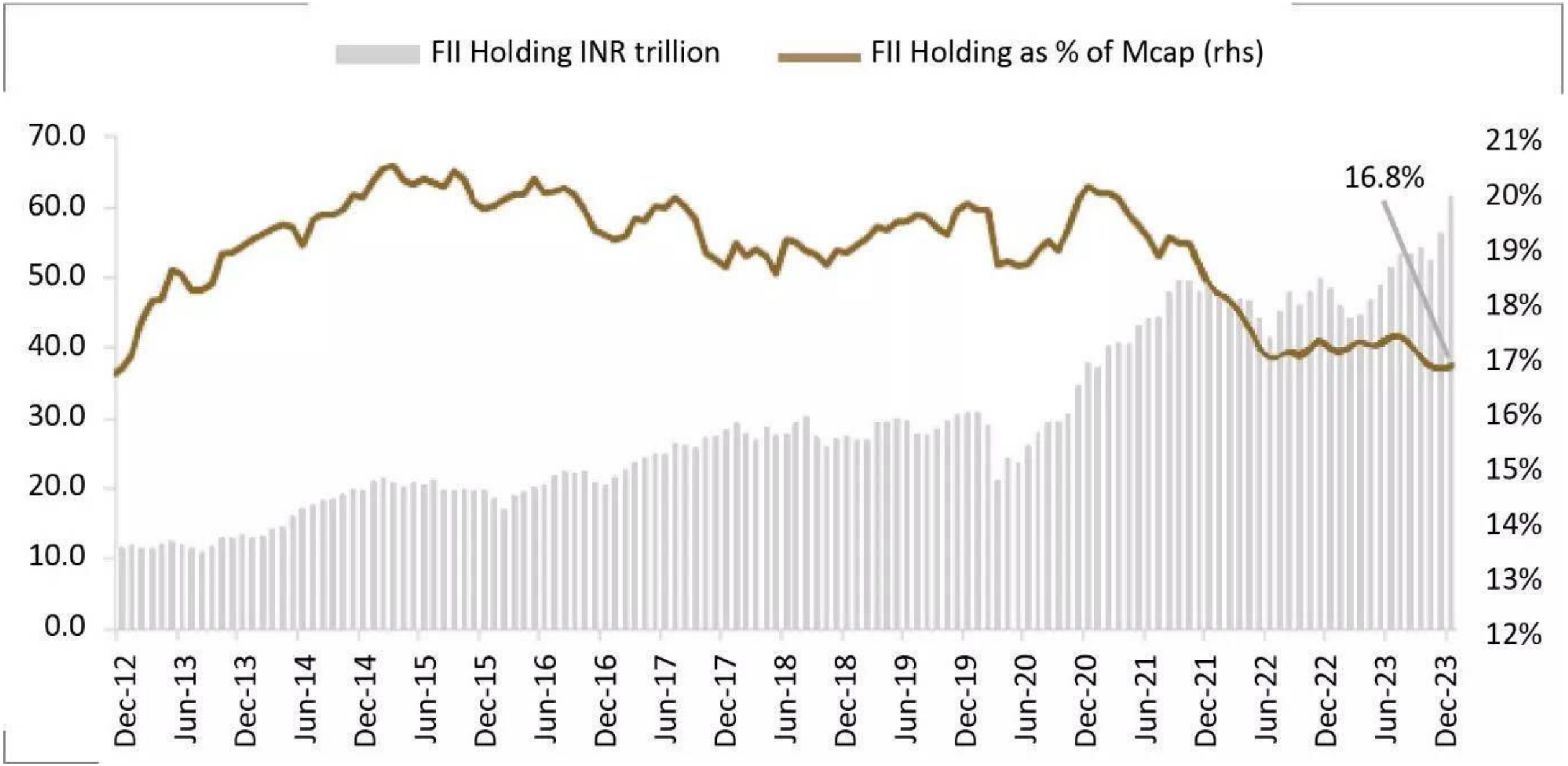
Stock market has rallied to all-time high valuation and the broader market is too expensive: Is that true?

Nifty is trading at 20.6x one year forward EPS – a premium of 15% over the last 10 years' average, but 10% cheaper than October'21 highs

Nifty PAT is predicted to have increased by 2.4x. The observation that markets reward greater growth is not surprising.

ET 15/03/2024


PAT (INR trillion)
Nifty
Nifty Midcap 100
9
8
7
6
5
4
3
2
1
0
3.3
0.6
3.0
0.6
3.8
.0
5.6
1.3
5.9
1.4
7.1
1.8
.0
2.1
FY19
FY20
FY21
FY22
FY23
FY24E
FY25E


FII Holding INR trillion
FII Holding as % of Mcap (rhs)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
21%
20%
19%
18%
17%
16%
15%
14%
13%
12%
16.8%
Dec-12
Jun-13
Dec-13
Jun-14
Dec-14
Jun-15
Dec-15
Jun-16
Dec-16
Jun-17
Dec-17
Jun-18
Dec-18
Jun-19
Dec-19
Jun-20
Dec-20
Jun-21
Dec-21
Jun-22
Dec-22
Jun-23
Dec-23

Linkage between Spot & Derivatives Market

- **Arbitrage and the Law of One Price**: Arbitrage process ensures that prices of an asset would be same across markets.
- **Storage Mechanism:** Storage is a form of investment which entails risk. Derivatives can be used to reduce that risk by providing a means of establishing today, that item's future sale price.
- **Delivery & Settlement**: At expiry, a forward / futures contract calls for immediate delivery of the underlying asset or cash payment. Thus, expiring forward /futures contract is like a Spot transaction. The price of the expiring contract should therefore be equal to spot price.
- *Hence, Derivative & Spot Markets are inextricably linked.*

Role of Derivatives Markets

- Risk Management: Derivatives are used to reduce risks.
- A wheat farmer sells his harvest (at the time of sowing itself) in the futures market there by reducing the price risk, which he faces at the time of harvest.
- Market participants whose wants to reduce their risk are called Hedgers.

- **Speculation**: Derivatives can serve as investment vehicles. Derivatives can provide away to make bets that are highly levered.
- If a Speculator has information about possible upturn in a price, he may go long on the forward market instead of the cash market.
- Market participants whose wants to increase their risk are called Speculators.

Role of Derivatives Markets

- Price Discovery: Forward and futures markets are an important source of information about prices.
- Futures price is a consensus reflecting the spot price of an asset in the future.
- **Operational Advantages:**
- Derivative markets entail lower transaction costs, hence makes them easier and attractive to use in lieu of spot markets.
- Derivatives Markets are usually more liquid (as less investment is required).
- Also allow for short selling of securities (not allowed in some spot markets).
- Market Efficiency: Through the use of arbitrage, the market efficiency is improved further.

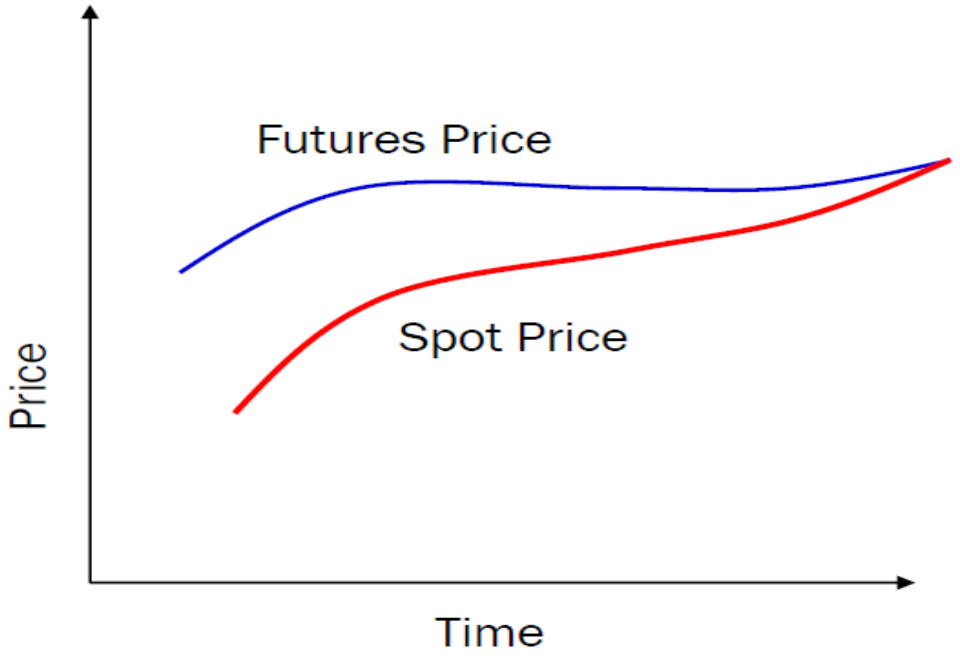
Equity Futures on NSE

Parameter	Index Futures	Futures on Individual Securities
Underlying	• Nifty 50 • Nifty IT • Nifty Bank • Nifty Midcap 50 • Nifty Infrastructure • Nifty PSE • Nifty CPSE • India VIX • DJIA • S&P 500 • FTSE 100	209 securities
Instrument	FUTIDX	FUTSTK
Trading Cycle	3 month trading cycle - the near month (one), the next month (two) and the far month (three)	
Expiry Day	Last Thursday of the expiry month. If the last Thursday is a trading holiday, then the expiry day is the previous trading day.	
Permitted Lot Size	Underlying specific	Underlying specific
Price Steps	Rs.0.05	Rs.0.05

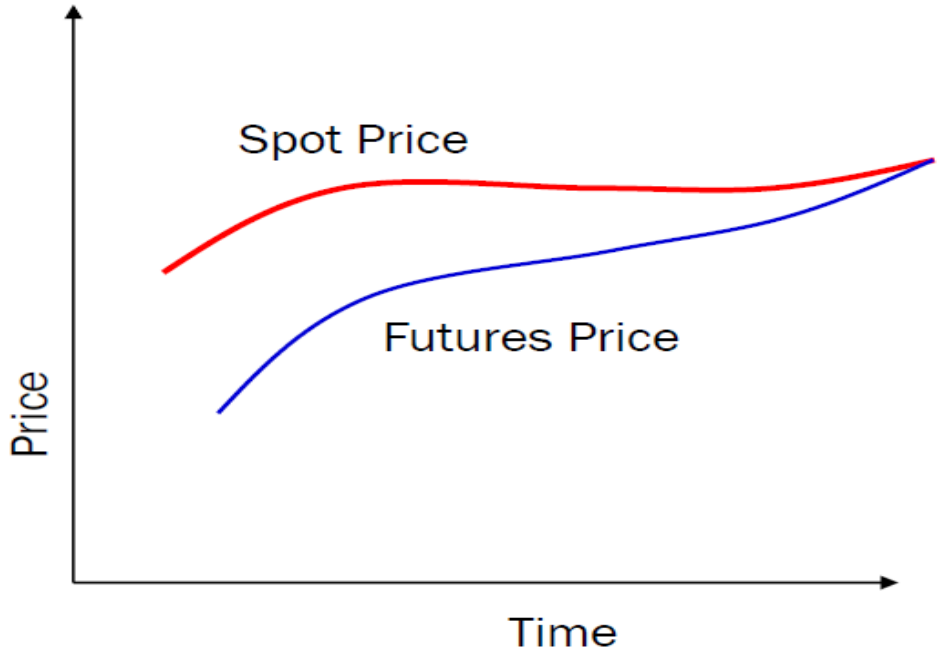
Currency Futures on NSE

Symbol	USDINR	EURINR	GBPINR	JPYINR
Unit of trading	1 - 1 unit denotes 1000 USD.	1 - 1 unit denotes 1000 EURO.	1 - 1 unit denotes 1000 POUND STERLING.	1 - 1 unit denotes 100000 JAPANESE YEN.
Underlying / Order Quotation	The exchange rate in Indian Rupees for US Dollars	The exchange rate in Indian Rupees for Euro.	The exchange rate in Indian Rupees for Pound Sterling.	The exchange rate in Indian Rupees for 100 Japanese Yen.
Tick size	0.25 paise or INR 0.0025			
Trading hours	Monday to Friday **9:00 a.m. to 5:00 p.m.**			
Contract trading cycle	12 month trading cycle.			
Last trading day	Two working days prior to the last business day of the expiry month at 12 noon.			
Final settlement day	Last working day (excluding Saturdays) of the expiry month. The last working day will be the same as that for Interbank Settlements in Mumbai.			
Initial margin	SPAN Based Margin			

Convergence of Futures to Spot Price



Contango
(Futures > Spot)



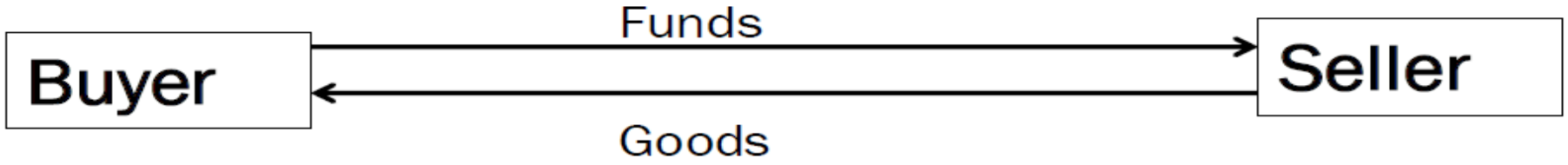
Backwardation
(Spot > Futures)

Clearing House

- To ensure smooth functioning, each Futures Exchange has a Clearing House (CH) associated with it.
- CH “guarantees” ALL trades on the Exchange.
- This is achieved by CH “adopting” the position of a Buyer for every Seller & “Seller” for every “Buyer”.
- Each trader has obligations only to the CH & hopes that CH will execute its side of the trade as well.
- CH substitutes its own credibility for the promise of each trader.
- CH, however, does not take ACTIVE position but “interposes” itself between all parties to every transactions.

- NSE : National Securities Clearing Corporation Ltd (NSCCL)
- BSE : Indian Securities Clearing Corporation Ltd (ISCCL)
- MSEI: MCX-SX Clearing Corporation Limited (MCCL)

Obligations without Clearing House



- Without CH, both parties would deal with each other-direct obligation to each other.

Obligations with Clearing House

- With CH, each party has obligation to the CH which ensures that both parties perform, the two parties need not trust or know each other.
- They need to be concerned about the reliability of the CH. Hence, CH is a large, well-capitalised Institution.

Operation of Margins

- When 2 investors contract, one party may back out or may not have the financial resources to honor his commitments.
- Futures Exchange organizes trades so as to avoid defaults, through a system of margins.
- Different types of margins are maintained:

✓Initial Margin (IM)

✓Maintenance Margin (MM)

✓Variation Margin (VM)

Operation of Margins

- Initial Margin (IM):Good faith deposit paid by the trader at the time of entering the contract to ensure performance.
- IM may vary from contract to contract & from trader to trader.
- Typically set at 5% of the contract value.
- Trader retains title to the deposit.
- Usually equal to Maximum Daily Price fluctuation limit.
- IM is returned upon proper completion of all the obligations.
- At the end of each day, the initial margin account is adjusted to reflect investor's gain/loss. →daily settlement or Mark–to –market

Operation of Margins

- **Maintenance Margin (MM)** :(% of the Initial Margin) is the minimum amount of margin below which amount in Initial Margin account should NOT fall.
- MM is used to calculate the third margin –**Variation Margin (VM)**.
- If the **Initial Margin** account falls below the MM, trader is required to replenish (*or top-up*) the Initial Margin account.
- This additional amount paid by the trader is called **Variation Margin**.
- Any amount in excess of the IM can be withdrawn by the investor.
- Failure to pay VM leads to the futures position being closed out.

Operation of Margins - *An Example*

- Suppose Mr. X is long on 5 Futures contract on gold at MCX. Each contract is for 100 grams. The price quoted is Rs. 15,550/-per 10 grams.
- Tick size is Re 1.
- Initial margin is 4% while maintenance margin of 90% of initial margin.

Operation of Margins

	A	B	C	D	E	F	G	H
1	Opening Price			15,550	/10 g			
2	No. of Futures Contract			5				
3	Contract size			100	g			
4	Initial Margin			4%	31,100			
5	Maintenance Margin			90%	27,990			

Case of Paul

- Let us take the case of Paul who has gone long in a futures contract expiring five days hence with Keith, at a futures price of 75. We will assume that the price at the expiration of the contract is 82.50. and that the prices at the end of each day prior to expiration are as follows.

- Paul is committed to buying 100 units of the asset, and that at the time of the trade, both the parties had to deposit 1,000 as collateral in their margin accounts. The collateral that an investor is required to deposit at the time of entering into a futures contract, is referred to as the Initial Margin.
- End of the Day Futures Prices

Day	Futures Price
0	75.00
1	78.50
2	73.50
3	71.00
4	79.50
5	82.50

Interpretations

- At the end of the first day the futures price is $ 78.50. This means that if a trader were to enter into a contract at the end of the that day, the applicable price per unit of the underlying asset would be 78.50. If Paul were to offset the position that he had entered into earlier that day, he would obviously have to do so by agreeing to sell 100 units at 78.50 per unit. If so, he would earn a profit of 3.50 per unit, or 350 in all.

- In the process of marking Paul's position to market, the broker will behave as though he were offsetting. Thus, he would calculate his profit as 350, and would credit this amount to his margin account.

- However, remember that Paul has not actually expressed a desire to offset. Consequently, taking cognizance of this fact, the broker would act as if Paul were re-entering into a long position at the prevailing futures price of 78.50.

- At the end of the second day, the prevailing futures price is 73.50. Thus, when the contract is marked to market on this day, Paul will make a loss of $ 500. It must be remembered, that his contract was re-written the previous day at a price of 78.50, and if the broker were to now behave as if he were offsetting at 73.50, the loss would amount to 5 per unit, or $ 500 in all. Having marked the contract to market, the broker would once again establish a new long position for Paul, this time at a price of 73.50.

Lets take Paul's case again

- Suppose initial margin =700

Day	Futures Price	Daily Gain/Loss	Cumulative Gain/Loss	Account Balance	Margin Call
0	75.00			1,000	
1	78.50	350	350	1,350	
2	73.50	(500)	(150)	850	
3	71.00	(250)	(400)	600	400
4	79.50	850	450	1,850	
5	82.50	300	750	2,150	

Closing a Futures Position

- **Delivery**- Delivery of the goods under the contract will automatically close the position.
- **Physical Settlement:** Physical delivery of the asset at a certain location at a specified time as per the exchange rules.
- Decision regarding location of delivery is with the seller.
- If seller decides to deliver the underlying, it would issue a “Notice of intention to Deliver” to the exchange.
- The exchange will then choose the party with the long position to accept the delivery.
- Usually, the notice is passed to the party with the oldest long position outstanding.
- Parties with long positions must accept delivery.
- **Cash Settlement:** Traders make payment at expiry of contract to settle any gain or loss.

Closing a Futures Position

- **Offset**: Most Futures contracts are settled by “Offsets”, by entering into a exactly reverse trade which shall cancel the original trade.
- The trader, in order to close the contract, should enter into an exactly reverse contract in terms of:

  (a)the underlying assets,

  (b)No. of contracts &

  (c)expiry date

Offset Trades – *An Example*

May 1	**Party A's Initial Position**: Bought 1 September Wheat Futures Contract @ Rs 2,200/-.	**Party B** : Sold 1 September Wheat Futures Contract @ Rs 2,200/-.
May 15	**Party A's Reversing Trade**: Sold 1 September Wheat Futures Contract @ Rs 2,300/-.	**Party C**: Bought 1 September Wheat Futures Contract @ Rs 2,300/-.

After the two trades, A's net position is Zero and is out of the market. B & C still have obligations to the CH.

Closing a Futures Position (Contd.)

- **Exchange for Physicals**: Buyer and Seller exchange for cash, the underlying asset outside the exchange system.
- **EFP vs. Offset:**
- Under both, the traders have completed their obligations & are now out of the market.
- Differs from Offsets:
- Traders actually exchange the physical goods.
- Futures is not closed by a transaction through the Exchange.
- Traders privately negotiate the terms, hence also called “ex-pit”.

Open Interest

- ‘Open Interest’ refers to the number of futures contracts outstanding (not squared off) at any point in time. It is the total no. of ‘open’ positions waiting to be liquidated before the contract’s maturity.
- OI rises with time as more and more investors enter into new contracts.
- As maturity approaches, investors unwind their positions by entering into reverse trades. Hence, OI starts to decline.
- Today’s newspaper carry yesterday’s trading data and day before yesterday’s Open Interest data.

  ✓Every trade needs a buyer & a seller

  ✓Any trade (long or short) initiated afresh raises OI

  ✓Any trade (long or short) that squares up existing position lowers OI

Basic Terms

- **Short selling:** Selling of an asset that is not owned by the Investor (seller).
- The investor borrows (thru his broker) the asset from someone who owns the asset.
- Investor has to pay to the owner of the asset, any income that is received on the asset shorted.
- Investor is required to maintain a margin account with his broker to ensure that the investor does not run away from his short position.

Determination of Forward/Futures Prices

Assumptions:

- No transaction costs.
- Uniform tax rate on all trading profits.
- All participants can borrow and lend at the same risk-free rate of interest.
- Market participants take advantage of the arbitrage opportunities which may arise.

Notations:

S_0 : Price of the underlying asset (in Cash Market) at t=0.

F_0 : Forward / Futures Price (in Futures Market) at t=0

r_f : Zero – Coupon risk-free rate pa. on continuous compounding basis.

Underlying asset provides no income

- Thus, so long the forward price is NOT equal to Rs. 506/- there would be an opportunity for arbitrageur to adopt either of the trading strategies and earn a risk-less profits.
- For NO ABITRAGE to take place, the Forward Price (F_0) should be exactly Rs. 506/-.

$$\text{Forward Price } (F_0) = S_0 e^{r_f T}$$

- $F_0 = S_0 e^{rT} = 500e^{(0.05)3/12} = 500 * 1.0126 =$ **Rs. 506/-**

Underlying asset provides no income

- Suppose a non-dividend paying stock is available for Rs. 500/-(S_O) and risk-free rate of Interest (r_f) is 5% pa.
- ***IF*** the 3-month Forward price (F_O) is relatively high at Rs. 535/-.
- An arbitrageur will earn risk-less profit, if he adopts the following trading strategy:

Today:

a) Borrows Rs. 500/- for 3 months @ 5% pa.

b) Buys the stock for Rs.500/- in the Cash Market

c) Sells 3-month forward contract on the stock at F_O of Rs. 535/-.

Underlying asset provides no income

At the end of 3 months:

The arbitrageur shall:

a) Repay the amount borrowed along with Interest

= Rs. 500/- + Interest @ 5% pa for 3 months

= $500*e^{(0.05*3/12)}$ = 500*1.0126= Rs. 506/- (approx.)

b) Deliver the stock under the Forward contract and receive Rs. 535/- .

➢ Cash Flows: **Inflow: Rs 535/- Outflow: Rs. 506/-**

- By following this strategy, the arbitrageur has locked in a risk-less profit of Rs.29/- i.e. (535-506)

Underlying asset provides no income

- *IF* the 3-month forward price (F_0)is relatively low as Rs. 475/- (instead of Rs. 535/-)
- An arbitrageur can adopt the following strategy and make risk-less profit:

Today:

a) Short Sell the stock @ Rs. 500/- in the cash market,

b) Invest the proceeds for 3-months @ r_f =5%p.a., and

c) Buy a 3-month forward contract on the stock @ Rs. 475/-

Underlying asset provides no income

At the end of 3-months:

The arbitrageur would:

a) Receive the loan of Rs. 500/- along with interest for 3 months = $500 * e^{(0.05)*(3/12)}$ = Rs. 506/-

b) Receive the stock under the forward contract and pay Rs 475/- for it.

➢ Cash Flows: **Inflow: Rs 506/- Outflow: Rs. 475/-**

- By following this strategy, the arbitrageur has locked in a risk-less profit of Rs.31/- i.e. (506 - 475)

Underlying asset provides no income

A 6-month forward contract on a non-dividend paying stock is entered into when the stock price is Rs. 2800/-. The risk-free rate of return is 8%pa.What should be the 6-month forward price?

S_0 = 2,800/- ; r_f = 8% pa ; T = 6/12 years = 0.5 years

Forward Price (F_0) $= S_0 e^{rT}$

$= 2800e^{0.08*0.5} = 2800*1.04081$

= Rs.2,914.27

Underlying asset provides no income

Consider the stock of Suzlon which is currently trading at Rs 85/-. The 3-month forward contract on Suzlon stock is available for Rs. 90/-. If the risk-free rate is 6% pa. (on continuous compounding basis) and the stock is not expected to pay any dividend over the next 3 months. Are there any opportunities for arbitrage?

Underlying asset provides no income

S_0 = 85/- ; r_f = 6% pa ; T = 3/12 years = 0.25 years;

F_{ACTUAL} = Rs.90/-

Theoretical Forward Price (F_0) = $S_0 e^{rT}$

$= 85e^{0.06*0.25}$ = Rs. 86.28

Theoretical Forward Price < Actual Forward Price, hence arbitrage opportunity exists:

Adopt Cash-and-Carry Arbitrage:

Now:

- Borrow Rs 85/- for 3 months @6%pa
- Buy stock @ Rs. 85/-
- Sell 3-month Forward @ Rs. 90/-

After 3 months:

- Repay loan with interest: $85e^{0.06*0.25}$= Rs. 86.28
- Deliver stock under forward contract and receive Rs. 90/-
- Profit = 90 – 86.28 = **Rs. 3.72**

Underlying asset provides no income

Shares of Megacorp are currently trading at Rs. 40/- and the 6-month forward on the stock is available at Rs. 38/-. If the risk-free rate is 8% pa. (cc) and the stock will not pay any dividend over the next 6 months, do you find any opportunities for arbitrage?

Underlying asset provides no income

S_0 = 40/- ; r_f = 8% pa ; T = 6/12 years = 0.50 years;
F_{ACTUAL}=Rs.35/-

Theoretical Forward Price (F_0)=S_0e^{rT}

$=40e^{0.08*0.5}$= Rs. 41.63 > Rs. 38/-

Adopt Reverse Cash-and-Carry:

Now:

- Buy 6-month Forward @ Rs. 38/-
- Short Sell the stock @ Rs. 40/-
- Invest Rs 40/- for 6 months @ 8%pa

After 6 months:

- Receive the loan with interest: $40e^{0.08*0.5}$= Rs. 41.63
- Buy the stock under forward contract for Rs 38/- and deliver the stock.
- Profit = 41.63 - 38 = **Rs. 3.63**

At t = 0	At maturity
+40-40	+41.63-38
Net = 0	3.63

Underlying asset provides known amount of cash Income

Forward Price (F_0) = (S_0 - I) e^{rt}

where 'I' is the present value of the income 'Y' received during the forward contract. ($I = Y * e^{-rt.}$)

Underlying asset provides known amount of cash Income

A stock will pay a dividend of Re 1 per share in 2 months and again in 5 months from now. The stock is currently selling for Rs. 50/- and the risk-free interest rate is 6%pa.What should be the price of a 6-month forward contract on the stock?

S_0 = 50/- ; r_f = 6% pa ; T= 6/12 yrs; D_2 = Re 1; D_5 = Re 1

Forward Price (F_0) = $(S_0 - I)e^{rT}$

$I = D_2e^{-rt_1} + D_5e^{-rt_2} = 1e^{-0.06*2/12} + 1e^{-0.06*5/12}$

$= 0.9900 + 0.9753 = 1.9653$

$F_0 = (50 - 1.9653)e^{0.06*6/12} = 48.0347*1.0305$

= Rs.49.4976 = Rs. 49.50

Value of a Forward Contract

- At inception, the value of Forward contract is Zero.
- Buyer(Seller) are indifferent between buying/(selling) the underlying asset now (at t=0) for spot price or buying (selling) at maturity for Forward price.
- As time passes, the price of the underlying asset changes, which makes the existing forward contract to become an asset or a liability.
- For **Long position** on Forward Contracts:

Value of FC on Maturity = **Forward Price** $_{New}$ – **Forward Price** $_{Old}$

Value of FC today = **PV of** $(F_N - F_0) = (F_N - F_0)\, e^{-rt^*}$

- For **Short position** on Forward Contracts:

Value of FC on Maturity = **Forward Price** $_{Old}$ – **Forward Price** $_{New}$ Value of FC today

= **PV of** $(F_0 - F_N) = (F_0 - F_N)e^{-rt^*}$

Value of a Forward Contract

One month ago the stock of ABC was trading at Rs. 114/. Now, the stock price has declined to Rs. 109/-. What would be the impact on the value of the 6-month forward contract that was contracted a month ago *(when the stock price was Rs. 114/-)*? Assume the risk-free rate of return as 7% pa. (cc).

S_{-1} = 114/- ; S_0 = 109/-; r_f = 7% pa; T= 6 months.

- Forward Price:

At t = -1 : $F_{OLD} = 114\ e^{(0.07)*6/12} = 114*1.03562 = 118/-$

At t = 0 : $F_{NEW} = 109\ e^{(0.07)*5/12} = 109*1.02960 = 112/-$

Value of Forward Contract (old) on **Maturity** = $F_N - F_0 = 112-118 = -6$

Value of Forward Contract (old) **today**

$= PV(F_N - F_0) = -6\ e^{-(0.07)*5/12} = -6(0.97125) = -$ Rs 5.83

Value of a Forward Contract

A long forward contract on a non-dividend paying stock was entered into some time back at a forward price of Rs. 24/-. The forward contract now has 6 months to maturity. The risk-free rate of return is 10% pa (cc), the stock is trading at Rs 25/-. What would be the impact on the value of the original forward contract now?

F_O = 24/-; S^*_O = 25/- ; r = 10% pa; T= 6 months.

Forward Price of New contract $F_N = S^*_O e^{rT}$

At t = O : F_{OLD} = **24/-**

At t = 1 : $F_{NEW} = 25\ e^{(0.10)*6/12} = 25*1.05127$ = **26.28**

Value of Forward Contract on Maturity= $F_N - F_O = 26.28 - 24 = 2.28$

Value of Forward Contract today = **PV** $(F_N - F_O)$

= **2.28** $e^{-(0.10)*6/12}$ = **2.28** (0.9512) = **Rs. 2.17**

Value of a Forward Contract

2 months back a US investor sold forward £ 2 million at a forward price of $ 1.61 per pound. After one month, the forward price for delivery in one month is $ 1.585 per pound. Suppose the one-month rate of interest is 6% (cc), what is the value of the investor's position?

$F_0 = \$1.61$; $F_N = \$1.585$; $r_f = 6\%$ pa; T= 1 month.

For **Short** Futures Position:

Value of Forward Contract on Maturity= $F_0 - F_N = 1.61 - 1.585$

Value of Forward Contract today= $PV(F_0 - F_N)$

$= 0.025e^{-(0.06)*1/12} = 0.025(0.9952) = \$\ 0.024875/\ £$

Investor with **short position** would receive

£ 2,000,000*0.024875 = $49,750/- on unwinding of the position.

Value of a Forward Contract

Consider the current spot price of ABC shares is Rs. 800/. Mr. A has bought one 6 month forward contract at Rs.900/. After one month, Mr. B offers to buy a 5-month forward contract on ABC shares at 925/- . If the risk-free interest rate is 9%, what is the value of Mr. A's contract?

- After one-month , if Mr A goes short on 5-month forward, he would receive Rs, 925/- (F_N) and would be required to deliver the stock of ABC, which he would get under the 6-month forward on which he is long for Rs 900/- (F_0).
- So his profit at T=6 or Value of Forward Contract on Maturity= $F_N - F_0 = 925 - 900 =$ Rs. 25/-.
- Value of Forward Contract **today** (when the 2nd forward is entered) = $PV(F_N - F_0)$

$$= (925 - 900)e^{-0.09*5/12} = 25*0.96319 = 24.07986$$

Forward Price vs. Futures Price

- When short term risk-free interest rate is constant, the forward price on a certain delivery date is same as the futures price for a contract with the same delivery date.
- However, when interest rates vary, the Forward price ***may not*** be same as the Futures price.

❑ *Suppose the price of the underlying asset is* ***strongly and positively*** *correlated with the interest rate.*

- In case of a Futures contract, when the price of the u/l asset increases, the investor with a long position would gain (due to daily settlement)
- As price increases, the interest rates would also increase.
- Hence, the gain will be invested at a higher interest rate.

Forward Price vs. Futures Price

- Similarly, when the price of the u/l asset decreases, the investor will incur an immediate loss.
- This loss will be financed at a lower interest rate.
- An investor holding a Forward contract (instead of a Futures contract) is not affected in this way by interest rate movements.
- So, a Long Futures contract will be slightly more attractive than a similar long forward contract.
- **Futures price tend to be slightly more than the forward price, if price of u/l asset and interest rates are *strongly positively correlated.***

Forward Price vs. Futures Price

- *Suppose the price of the underlying asset is **strongly and negatively** correlated with the interest rate.*

- In case of a Futures contract, when the price of the u/l asset increases, the investor with a long position would gain (due to daily settlement)
- As price increases, the interest rates would now decrease.
- Hence, the gain will be invested at a lower interest rate.
- Similarly, when the price of the u/l asset decreases, the investor will incur an immediate loss.
- This loss will be financed at a higher interest rate.
- An investor holding a Forward contract (instead of a Futures contract) is not affected in this way by interest rate movements.

Forward Price vs. Futures Price

- So a Long Futures contract will be slightly less attractive than a similar long forward contract.
- **Futures price tend to be slightly less than the forward price, if price of underlying asset and interest rates are strongly positively correlated.**

➢ *The theoretical difference between Forward price and Futures price for short term contracts (less than a few months) usually small and hence ignored.*

➢ ***For most purposes, Forward and Futures price is considered to be same.***

Forward/Futures prices of Currencies

Direct Quote: Units of HC per FC

Spot: INR 70 = 1USD
Forward: INR 74.50= 1USD
$r_{f\,(FC)}$ = 1% pa (cc)
$r_{f\,(HC)}$ = 6.5%pa (cc)
Time = 1 year

100 units of USD at t=0

Invest FC @ $r_{f\,(FC)}$ & Convert FC in HC @ F_0 today

Convert FC in HC @ S_0 & invest HC @ $r_{f\,(HC)}$ today

Invest FC @ $r_{f\,(FC)}$ for 1 year

$100e^{0.01*1} = 101.00502$ USD

Convert FC into HC @ So today

$100*70 = 7000$ INR

Convert FC into HC @ Fo today

101.00502 USD*74.50 =7524.87374 INR

Invest HC @ $r_{f\,(HC)}$ for 1 year

$7000e^{0.065*1} = 7470.11317$ INR

$100e^{r_{f\,(FC)}T} F_0$ should be equal to $100S_0e^{r_{f\,(HC)}T}$

$$F_0 = S_0e^{(r_{HC} - r_{FC})T}$$ → Interest Rate Parity

Theoretical $F_0 = 70e^{(0.065 - 0.01)\,1} = 70(1.05654) = 73.95784$

Forward/Futures prices of Currencies

2-month interest rates in Switzerland and India are 3% & 6% pa (cc). Spot price of Swiss franc is Rs. 33.778. What should be the 2-month forward of Swiss franc?

$S_0 = 33.778$; $r_{HC} = 6\%$pa ; $r_{FC} = 3\%$ pa; $T = 2/12$ years

$$F_0 = S_0 e^{(r_{HC} - r_{FC})T}$$

$$= 33.778\, e^{(0.06 - 0.03)2/12}$$

$$= 33.778\, e^{0.005} = 33.778\,(1.00501) = \textbf{Rs. 33.9473}$$

Currency with higher interest rate should depreciate.

Forward/Futures prices of Currencies

Suppose the spot price of AUD is 0.7500USD and the 2-year interest rate in Australia and USA are 3% & 1% respectively. What should be the arbitrage–free forward price of AUD. If the forward rate actually turns out to be (a) 0.7000 USD; (b)0.7600 USD, instead, what arbitrage opportunities will arise. (Direct Quote)

1 AUD = 0.7500 USD; $r_{HC\ (USD)}$ = 1%pa ; $r_{FC(AUD)}$ = 1% pa; T = 2 years

$$F_0 = S_0 e^{(r_{HC} - r_{FC})T}$$

$$= 0.7500\ e^{(0.01 - 0.03)*2}$$

$$= 0.7500*0.9608 = 0.7206 \text{ USD}$$

Currency with higher interest rate should depreciate.

(USD has appreciated against AUD in the forward market.)

Forward/Futures prices of Currencies

- If F_{ACTUAL} = 0.7000 USD/AUD: *(In the future, less USD are required to get 1 AUD, so 'x' units of USD would fetch more AUD, hence we need to have USD in the future or AUD now.)*

1.	Borrow 1000 AUD @ 3%pa for 2 years	1000.00 AUD
2.	Convert 1000 AUD in USD @ 0.7500 USD/AUD	750.00 USD
3.	Invest 750 USD @ 1% pa for 2 years to yield ($750e^{0.01*2}$ = 750*1.02020 = 765.15101 USD)	765.15 USD
4.	Amount required to repay the AUD borrowings ($1000e^{0.03*2}$ = 1000*1.06184 =1061.8366)	1061.84 AUD
5.	Out of 765.15 USD, convert Amount Equivalent to the amount required in AUD (1061.8366* 0.7000=743.2856)	743.29 USD
6.	**Risk-free Profit (3 – 5)**	**21.86 USD**

Forward/Futures prices of Currencies

- If F_{ACTUAL} = 0.7600 USD/AUD: *(In the future more USD are required to get 1 AUD, so 'x' units of AUD would fetch more USD, hence need to have AUD in the future i.e USD now)*

1.	Borrow 1000 USD @ 1%pa for 2 years	1000.00 USD
2.	Convert 1000 USD to AUD @ 0.7500 USD (1000USD/0.7500)	1333.33 AUD
3.	Invest 1333.33 AUD @ 3% pa for 2 years to yield ($1333.33e^{0.03*2}$ = 1333.33*1.06184)	1415.78 AUD
4.	Convert AUD in USD @ F_A today (1415.78 *0.7600)	1075.99 USD
5.	Amount required to repay the USD borrowings ($1000e^{0.01*2}$ = 1000*1.0202)	1020.20 USD
6.	**Risk-free Profit (4 – 5)**	**55.79 USD**