Money Market

Products & Opportunities

CHANDRASHEKHAR UPADHYAY

FACTORS MOVING THE MARKETS…

- *Projected Eco Growth around 5.50%*
- *Forex Reserves 278.60bn*
- *Liquidity … RBI. Repo 39Kcr*
- *Call rates …around 8.75- 10.35%*
- *Inflation WPI 4.86% (Jun.) & 5.79 (Jul)*
- *Choppy Equity.. Around 18400*
- *Money supply Approx. INR 83 Trillion*
- *Credit Growth around 13.70%*
- *Deposit growth around 13.80%…*

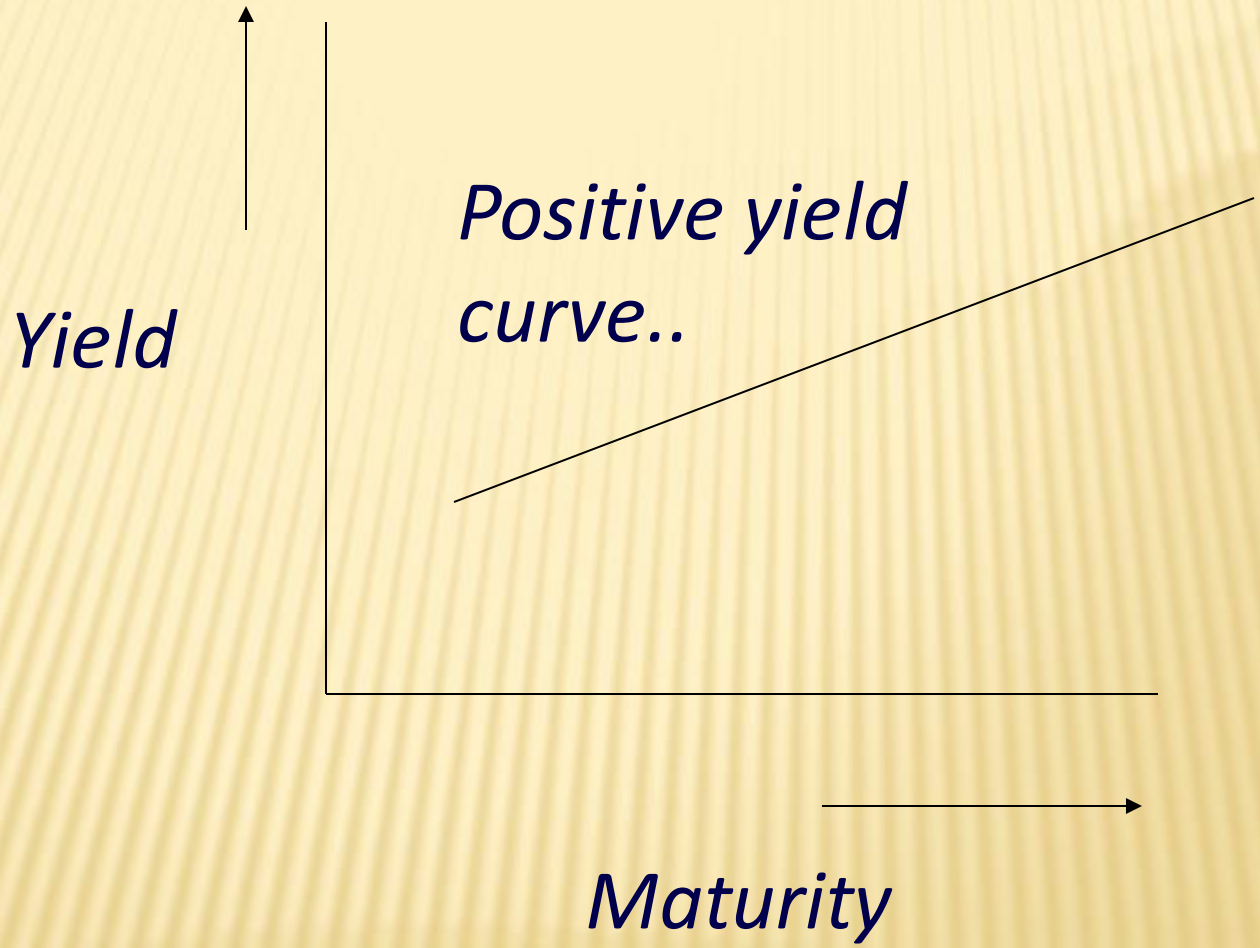
Table 5.6: Weighted Average Interest Rate on

Year	Centre	States
1990-91	11.4	11.5
1991-92	11.8	11.8
1992-93	12.5	13.0
1993-94	12.6	13.5
1994-95	11.9	12.5
1995-96	13.8	14.0
1996-97	13.7	13.8
1997-98	12.0	12.8
1998-99	11.9	12.4
1999-00	11.8	11.9
2000-01	11.0	11.0
2001-02	9.4	9.2
2002-03	7.3	7.5
2003-04	5.7	6.1
2004-05	6.1	6.4
2005-06	7.3	7.6

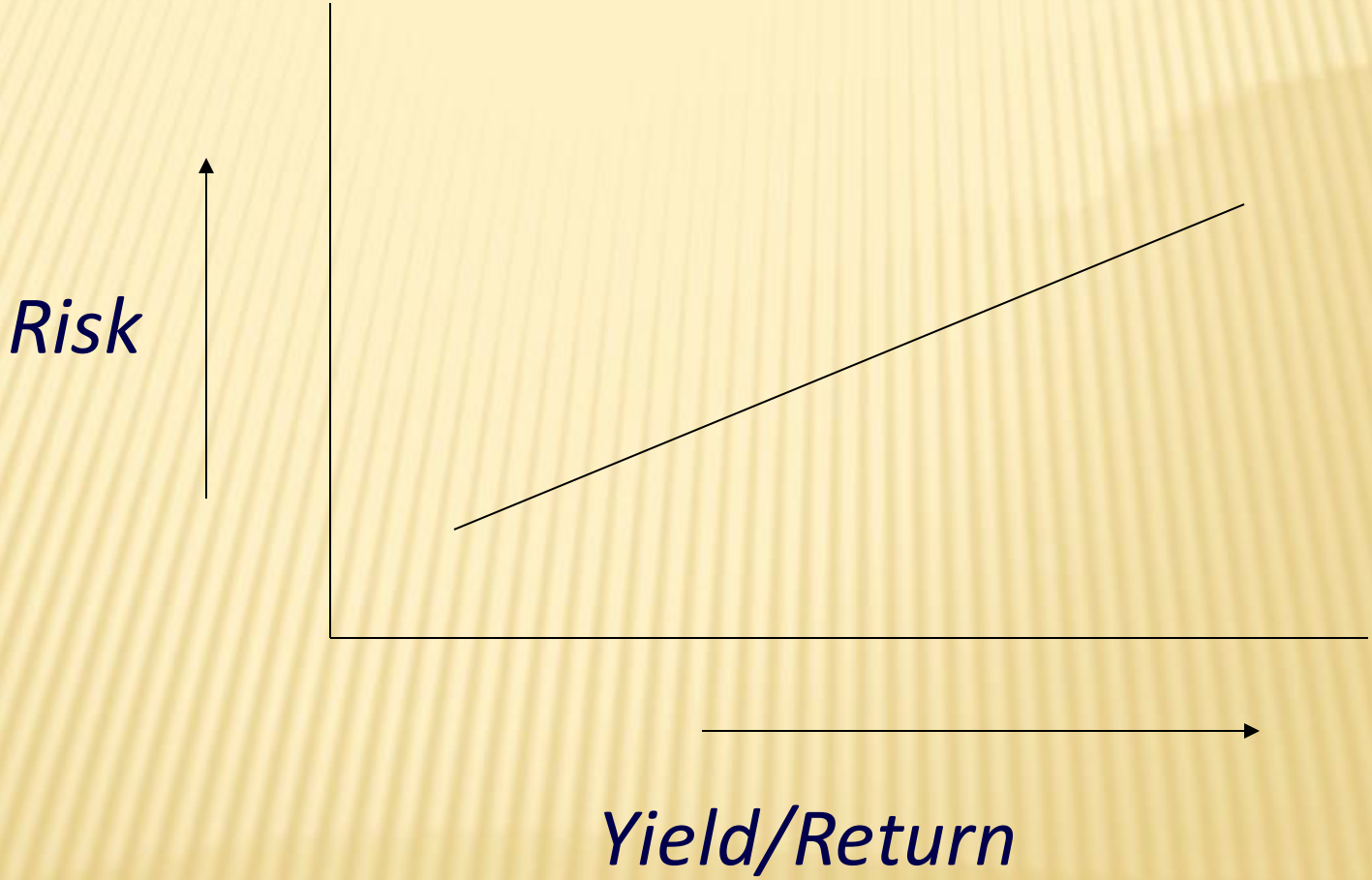
Essentials for Funds Management

- *Safety*
- *Liquidity*
- *Return*
- *We need to strike a balance amongst these three parameters.*

Longer the maturity, higher the yield

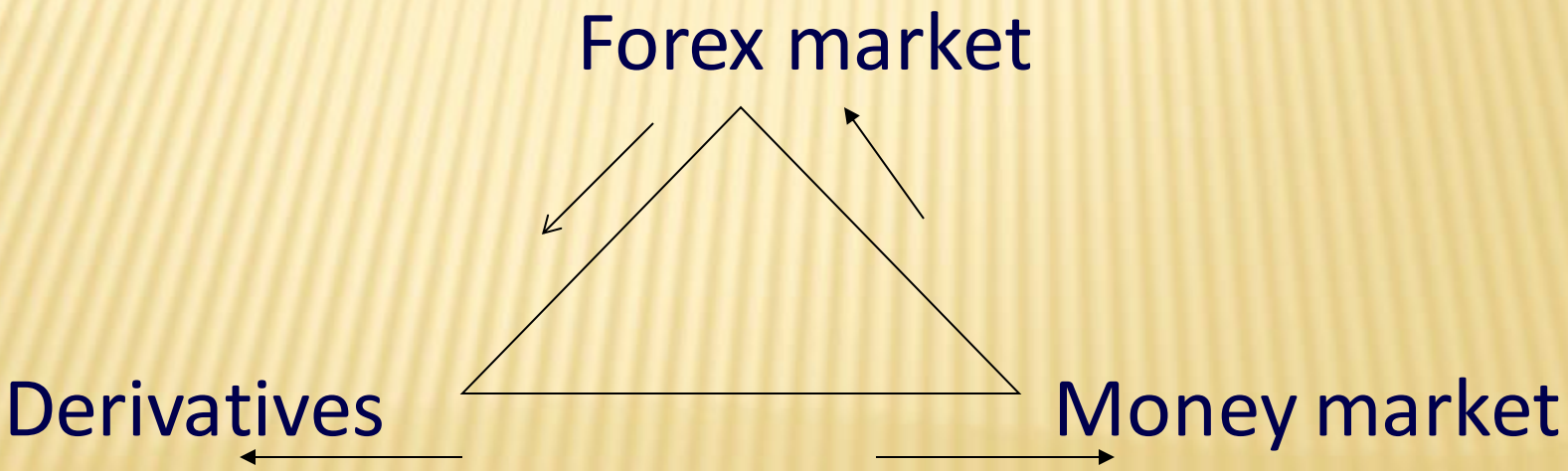


Higher the risk, higher the yield



MOVEMENT OF FUNDS..

- *Forex – Debt – Equity- Derivatives – Real estate – Commodities – Money Market….*



FIXED INCOME..

- India has large Debt market of around US$350bn securities
- Higher inflation and Credit demand with economic growth during the last decade – had direct impact on Bonds – yields came down from 2003-2008 but went up during 2008-11 period from 5 to 9.25%.
- RBI has cut CRR/SLR and Repo rates resulting in yields dropping around 7.15%. But depreciating rupee forced RBI to take steps to reduce liquidity resulting in yields moving up.
- Govt. Debt makes up 72% of the longer dated market
- RBI plays major role in Bond market and the auctions are Price based or yield based.
- T-Bills are issued through French-style competitive auction with 91 days , 182 days and 364 days instruments. INR 725 bn.
- GOI bonds are issued for 2 to 30 yr maturity
- State govt bonds are issued for 10 yrs
- All securities are settled for value T+1.
- Public sector and Corporate bonds are issued for 1 to 15 yrs
- Int is calculated actual/365 for all INR securities – while GOI and State Govt bonds are based on 30/360.

Various Money Market Products

- *Call Money / Notice Money / Term Money*
- *Treasury Bills*
- *Commercial Paper*
- *Certificate of Deposits.*
- *LAF / Repo / Reverse Repo*
- *CBLO*
- *Bills Rediscounting .*
- *IBPC*
- *CMB*

VARIOUS MONEY MARKET PRODUCTS

- Call Money – Money borrowed by a scheduled bank for a day @ O/N MIBOR in the Inter Bank Market.
- Notice Money - Money borrowed by a scheduled bank for 2 - 14 days.
- Tem Money - Money borrowed by a scheduled bank for 15 days to 364 days.

VARIOUS MONEY MARKET PRODUCTS

- Treasury Bills – Money borrowed by C. Govt. through RBI auction process for 91 /182 / 364 days by issue of T-bills. They are issued at a discount price & redeemed at face value.
- Sometimes they are issued “on tap basis” or as Ways & means advances for the sake of S. G.
- Yield = (Discount*365)/(Issue Price or CMP * No. of Days money invested)

VARIOUS MONEY MARKET PRODUCTS

- *Certificate of Deposit (CD) is a negotiable money market instrument issued in dematerialised form or as a Usance Promissory Note, for funds deposited at a bank or other eligible financial institution for a specified time period.*
- *CDs can be issued to Individuals, Corporations, Companies, Trusts, Associations & Banks*
- *CDs can be issued by (i) Scheduled Commercial Banks excluding Regional Rural Banks (RRBs) and Local Area Banks (LABs); and (ii) Select all-India Financial Institutions that have been permitted by RBI to raise short-term resources*
- *The minimum amount for which a CD can be issued is Rs.1 lakh and in multiples of Rs.1 lakh thereafter*
- *CDs issued by banks should not be for less than 7 days and not more than 364 days. Hence CD's are considered as good short term investments*
- *Different rates of Stamp duty are applicable depending upon the tenure of the issue. Stamp Duty applicable will be borne by the issuer*

VARIOUS MONEY MARKET PRODUCTS

- **Liquidity Adjustment Facility** – Facility available to Scheduled Commercial Banks to borrow Funds / Lend Funds to RBI against approved security @ Repo / Reverse Repo rates.
- **REPO** – Repurchase Obligation is facility available to Scheduled Banks to borrow funds against approved security.
- **REVERSE REPO** – Facility for Banks to deposit funds with RBI against security.

REPO TRANSACTIONS

Broadly, there are 4 types of repo transactions –

1. Buy – Sell Repo (Normal)
2. Classic Repo (Sale & Repurchase price is fixed while Interest Payment is separately made.
3. Hold in Custody Repo where security is held in trust by the seller during the repo period.
4. Tripartite Repo (Common custodian / Clearing Agency arranges for custody & settlement)

Various Money Market Products

Bill Rediscounting *– Treasury rediscounts commercial usance bills already discounted by other Banks.*

IBPC – INTERBANK PARTICIPATION CERTIFICATE *– is treated as short term Money market instrument. It is confined to Banks and helps in management of Capital Adequacy and Balance sheet. Participation is on risk sharing basis – underlying asset must be HC I as standard assets.*

ARBITRAGE IN THE FOREX & MONEY MARKETS

- Arbitrage – involves simultaneous purchase and sale of identical or equivalent instruments from two or more markets in order to benefit from a discrepancy in their prices
- Belief – that arbitrage funds are risk-free because in arbitrage both buying and selling exactly offset each other, thus immune to market movements
- Profit in this strategy is – the difference between the prices in different markets
- Fact -- is that arbitrage funds are not risk-free. The availability of arbitrage opportunities, 'perfect' execution, liquidity and future segments are some of the factors that contribute to the uncertainty therefore risk with respect to this investment avenue

If perfect conditions prevail then arbitrage opportunity does not arise

ARBITRAGE IN THE FOREX & MONEY MARKETS

- Factors affecting the markets
  - Call rate / G-sec yields
  - USD o/n rate / treasury yields
  - Govt. borrowing program
  - Credit policy announcements
  - Spot INR
  - Demand & supply

Such opportunities came after RBI paved the way for Integration of FX and Money Markets in the late 1990's and early 2000.

ARBITRAGE IN THE FOREX & MONEY MARKETS

- If perfect conditions prevail the exchange rate for a currency should be the same in all centers.

  E.g. If USD is quoted at 67.35 in Mumbai then it should be 67.35 in the New York market also
- Since imperfect conditions prevail the rates may be different in these centers
- The purchase and sale of a foreign currency in different centers to take advantage of the exchange rate is ‘arbitrage operation’ and when this involves only two currencies it is known as ‘simple’ or ‘direct’ arbitrage
- If it involves more than two currencies it is a ‘compound’ or ‘indirect’ arbitrage

ARBITRAGE IN THE FOREX & MONEY MARKETS

- Example of a Simple FX arbitrage
  - In Mumbai USD/INR is 67.35/37
  - In New York USD/INR is 67.42/44
  - Bank in Mumbai will buy USD locally and arrange to sell them in the New York market
  - If it involves USD 1,000,000 then the bank would buy USD @ 67.37 in Mumbai
  - Realization on selling USD in the New York market would be Rs. 67.42
  - Gross Profit Rs. 50,000/= and the net profit would be after deducting transaction charges

ARBITRAGE IN THE FOREX & MONEY MARKETS

Example for a Compound or Indirect Arbitrage

- Mumbai on New York – Rs.67.42 – USD/INR
- New York on London – 1.5500 – GBP/USD
- Mumbai on London – Rs. 104.71 – GBP/INR
- Based on USD/INR and GBP/USD the rate should be Rs.104.50 but market is Rs.104.71 So to take advantage of arbitrage opportunity in these markets the bank can buy USD locally, sell it in New York to buy GBP there. Let us assume the transaction is for USD 1,000,000.
- Buys USD 1,000,000.00@ 67.42 for INR 67,420,000/=
- Sells USD and buys GBP at 1.5500 at Newyork – 1,000,000.00 / 1.5500 = 645161.30 GBP
- Sells GBP 645161.30 at Rs.104.71 and gets Rs.67,554,839/=
- Gross profit is Rs.1,34,839.00

ARBITRAGE IN THE FOREX & MONEY MARKETS

- **Interest Arbitrage**

  Operation to benefit higher yield obtainable on the short term employment of liquid funds in a foreign currency with or without hedging the exchange risk

- **Interest rate arbitrage inward**

  Transfer of short term funds into a local currency for the sake of higher yield

- **Interest rate arbitrage outward**

  Transfer of short term funds into a foreign currency for the sake of higher yield

ARBITRAGE IN THE FOREX & MONEY MARKETS

- Interest rate arbitrage is based on the following
  - Supply and demand for the currency
  - Markets expectation about the future and developments likely to take place in interest rates and foreign exchange
  - Interest rate differentials between the countries
  - However if there are no capital controls the interest rate differential is the most dominant factor in determining the future rates

- Important point -- A base currency with a lower interest rate is at a premium and a base currency with a higher interest rate is at a discount in the forwards

ARBITRAGE IN THE FOREX & MONEY MARKETS

- Example to illustrate how the interest rates determine the forward rate (points) of a currency
- Spot USD/SGD ---- $ 1 = SGD 1.2250
- Interest USD is 1.25% and SGD is 3.00% p.a.
- Suppose we borrow USD 100 for 1 year @ 1.25% p.a. and place it in a SGD deposit at 3% p.a. for 1 year, our cash flows will be as per the next slide assuming that the USD/SGD exchange rate is the same in the spot and forward
- To avoid this clear and easy arbitrage the forward rate has to adjust and the USD/SGD rate will be
- USD 101.25 = SGD 122.50*1.03 so USD 1 = 1.26175 / 101.25 = SGD 1.2462

ARBITRAGE IN THE FOREX & MONEY MARKETS

	USD	USD	SGD	SGD
	Inflow	Outflow	Inflow	Outflow
Spot borrow Sell $ 1 year Interest	+100	 -- 100 -- 1.25	 +122.50 + 3.675	
Total Sell SGD 1 yr @ 1.2250	 +103	-- 101.25	+126.175	 --126.175
Net Gain	USD 1.75			

ARBITRAGE IN THE FOREX & MONEY MARKETS

- Some Calculations to arrive at the forward points and interest rate differentials

- To calculate the forward points the formula is

$$\frac{\text{Spot fx rate x interest rate differential x forward period}}{\text{100 x no. of days in the year}}$$

- To calculate the interest rate differential the formula is

$$\frac{\text{Fwd points x no. of days in a year x 100}}{\text{spot fx rate x forward period}}$$

ARBITRAGE IN THE FOREX & MONEY MARKETS

- To calculate the forward points and interest rate differential in a cross currency when

- Spot exchange rate is 1.225000,
- Interest rate differential is 1.75% p.a.,
- Forward period is 90 days and
- No. of days in a year is 360

- Forward points = 1.2250 x 1.75 x 90 / 100 x 360 = 0.0054

- Interest rate differential
- 0.0054 x 360 x 100 / 1.2250 x 90 = 1.75% p.a.

ARBITRAGE IN THE FOREX & MONEY MARKETS

- To calculate the forward points and interest rate differential in INR, when
- Spot exchange rate is 67.45
- Interest rate differential is 6% p.a.
- Forward period is 90 days
- No. of days in a year 360

- Forward premium is
- 67.45 x 6 x 90 / 100 x 360 = 1.01175
- Interest rate differential is
- 1.01175 x 360 x 100 / 67.45 x 90 = 6%

ARBITRAGE IN THE FOREX & MONEY MARKETS

- A very important aspect of our market is the arbitrage between the local money market and the FX
- Liquidity dictates this arbitrage influenced by other factors like call money, G-Sec, Overseas Overnight rates, Demand – Supply etc.
- The most likely arbitrage is in the cash or short term markets with some overflow to the forward markets as well
- Surplus/shortage of local currency/foreign currency
- Yields in local / foreign markets
- Large inflows / outflows of local/foreign currency
- Merchant flows, are the drivers

ARBITRAGE IN THE FOREX & MONEY MARKETS

- In the overnight market the arbitrage is due to yields either at high levels in the local or overseas market
- Such deployment takes place based on the call money, US o/n rates etc.
- Let us study an example
- If Call money is at 10.25 / 10.35 % , US O/N rate is at 0.150%, Spot USD/INR is 67.50, Cash/spot is 0.0360 / 0.0380 --- where should the money be deployed ?
- If surplus dollars is available then cost for swapping rupee to dollar will be 0.0360 x 36500 / 2 x 67.50 = 9.73%, so 9.73%+0.15%=9.88% whereas call money is at 10.25%
- If surplus rupee is available then cost for swapping dollar to rupee will be 0.0380 x 36500 / 2 x 67.50 = 10.27%, so 0.15%+10.27% = 10.42%, whereas call money is at 10.35%

INTEREST RATE DERIVATIVES

- Forward Rate Agreements
- Interest Rate Swaps
- Interest Rate Futures

FORWARD RATE AGREEMENT (FRA)

- Forward rate: a rate given today for borrowing or lending in future
- The amount of borrowing or lending is the underlying
- How it works

FRA

- I need a 3-month funding 4 months from now
- I will have funds to invest for 3 months, 4 months from now
- Interest rate uncertainty
- I want your bank to quote a rate at which I can borrow or lend
  - Lock-in the borrowing rate
  - Lock-in the investment rate

FRA

- The borrowing rate will be higher than the lending rate
- In this case, either way, it is a 4 x 7 FRA

FRA

- Borrowing forward:
  - I want to borrow Rs.100 crore 4 X 7 forward against MIBOR
  - The bank quotes 4 x 7 rate of 4.6% (p.a.)
  - If after 4 months, 3-month MIBOR is quoting at 4.8%, the bank refunds 0.2%
  - If after 4 months 3-month MIBOR is 4.4%, I refund to the bank 0.2%

FRA

Payoff Table

4.80%-4.60% 4x7 FRA for Rs.100 crore

MIBOR after 4 months		BORROWER	LENDER	BANK
		4 months from now for a period of 6 motnhs		
		4.60%	**4.50%**	
4.80%	Receives	0.20%		-0.20%
	Pays		0.30%	0.30%
		4.60%	**4.50%**	**0.10%**
	Receives		0.10%	-0.10%
4.40%	Pay	0.20%		0.20%
		4.60%	**4.50%**	**0.20%**

FRA

MIBOR after 4 months		BORROWER	LENDER	BANK
		4 months from now for a period of 6 motnhs		
		4.60%	**4.50%**	
4.80%	Receives	4.80%	4.50%	-9.30%
	Pays	4.60%	4.80%	9.40%
	Net	**0.20%**	**-0.30%**	**0.10%**
	Receives	4.40%	4.50%	-8.90%
4.40%	Pay	4.60%	4.40%	9.00%
	Net	**-0.20%**	**0.10%**	**9.00%**

FRA

MIBOR after 4 months		BORROWER	LENDER	BANK
		4 months from now for a period of 6 motnhs		
		4.60%	**4.50%**	
4.80%	Receives	MIBOR	4.50%	-9.30%
	Pays	4.60%	MIBOR	9.40%
	Net	**0.20%**	**-0.30%**	**0.10%**
	Receives	MIBOR	4.50%	-8.90%
4.40%	Pay	4.60%	MIBOR	9.00%
	Net	**-0.20%**	**0.10%**	**0.10%**

FRA

- FRA is a one-time fixed-floating swap
- If you want to fix your future borrowing rate you receive floating, pay fixed (buy a FRA)
- If you want to fix your future investment rate you pay floating, receive fixed (sell a FRA)

MECHANICS OF PRICING FRA

4 x 7 FRA (bank pays MIBOR receives fixed)

- Bank borrows at t=0 an amount 'X' at fixed rate for 7 months at 7 month MIBOR prevailing at t=0
- 'X' is an amount that will grow to Rs.100 crore 4 months from now @ 4-month MIBOR prevailing at t=0
- At t=4, invest Rs.100 crore for 3 months at 3-month MIBOR prevailing then
- Bank passes on MIBOR to the FRA buyer and receives a fixed rate in interest
- At t=7, Rs.100 crore is received back. This along with fixed interest received from the FRA buyer should be sufficient to pay off the 7-month borrowing of 'X' crore along with interest

PRICING FRA

- 3-month MIBOR 5.36%
- 7 month MIBOR 5.45%
- t=0: borrow 100/(1+0.0536/12*3)= Rs.98.68 crore for 7 months at 5.45%
- t=0: Invest 98.68 at 5.36% for 3 months at t=0
- t=3: Invest Rs.100 cr at MIBOR for 4 months
- t=7: Pass on MIBOR to FRA counterparty
- 100 + r*100 = 98.68(1+0.0545*7/12)
- 100*(1+r)=101.817or r = 101.817/100 –1 = 1.817% for 3 months
- 5.451% p.a.

FRA SETTLEMENT

- Example
- Bank A and X Ltd. enters into a 3 X 6 FRA. X Ltd. pays FRA rate at 9.00 %. Bank A pays benchmark rate based on FIMMDA Moneyline Telerate 90 Day CP Benchmark.
- Notional principal amount (NPA): Rs. 1 crore
- FRA trade date: January 3, 2005
- FRA start/settlement date: April 3, 2005
- FRA maturity date: July 3, 2005
- FRA fixing date: April 2, 2005
- Assume, FIMMDA Moneyline Telerate 90 Day CP Benchmark on fixing date (April 2, 2005) is 8.50 %.

FRA SETTLEMENT

- Cash flow calculations:
- **Interest payable by X Ltd.:**
- Rs.1 crore * 9.00% * 91/365
- i.e. Rs. 2,24,384/-
- **Interest payable by Bank A:**
- Rs.1 crore * 8.50% * 91/365
- i.e. Rs. 2,11,918/-
- Net interest receivable by Bank A on the maturity date i.e. July 3, 2005: Rs. 12,466/-
- However, the settlement of the amount is to be done on April 3, 2005 on the discounted value i.e.

FRA SETTLEMENT

- $\frac{12,466}{\{1 + 8.50\% * 91/365\}}$
- i.e. Rs. 12,207/-
  - X Ltd. will pay to Bank A Rs. 12,207/- on April 3, 2005

WHEN TO USE FRA

- To cover future short term borrowing in uncertain interest rate environment in a rate rise scenario
- To hedge against short term reinvestment risk in a rate fall scenario

INTEREST RATE SWAPS

- Borrower ‘B’ has a MIBOR based floating rate loan of Rs. 10 crore on which he pays intt. at M + 0.50% at half quarterly rests. the interest resets every 3 months. The un-expitred tenor of the loan in 3 years. thus the borrower is exposed to 12 interest rate resets. B is concerned that MIBOR may go up.
- ‘S’ agrees to pay ‘B’ MIBOR on Rs.10 crore in return ‘b’ will have to pay ‘s’ 7% on Rs.10 crore every quarter.

INTEREST RATE SWAPS

- **What are the cash flows to B**

  Outflow on original loan : M+0.50%

  Inflow from swap dealer : M

  Outflow to swap dealer : 7 %

  Net outflow : 7.5%

  Thus ‘B’ is protected from interest rate volatility

- Interest rate swap is a bilateral agreement to exchange a sequence of interest payments of different characteristics based on a notional amount which is neither lent or borrowed

ECONOMIC RATIONALE OF IRS

Example

- Two companies both wish to borrow Rs. 10 crore. Company A is a conglomerate with top credit rating and prefers a fixed interest rate. Company B is a medium sized company with a lower rating and prefers a floating rate. The quoted rates of for the two companies are:

Offered Rates

Company	Fixed	Floating
A	7.5%	MIBOR + 0.5%
B	9.0%	MIBOR + 3.5%

ECONOMIC RATIONALE OF IRS

- A borrows at floating rate on behalf of B at MIBOR+0.5% and
- B borrows at fixed rate on behalf of A at 9%
- They swap the liabilities
- B gains 3%
- A loses 1.5%
- Net gain of 1.5% - which A & B can share
- Difficulties of finding such matching partners
- Hence advent of S – the Swap Dealer

ECONOMIC RATIONALE OF IRS

- The Swap Deal:
  - A borrows at floating rate at MIBOR+0.5%
  - A receives MIBOR from S and pays 6.5 % to C
  - B borrows at fixed rate 9%
  - B receives 6 % from S and pays MIBOR

IRS: CASH FLOWS

	A	B	S
A Pays to lender	- (M+0.5%)		
A Pays to S	- 6.5%		+ 6.5%
A Rec. from S + M			- M
B Pays to lender		- 9%	
B Pays to S		- M	+ M
B Receives from S		+ 6%	- 6%
Net	- 7%	- (M + 3%)	+ 0.5%

VALUATION OF BONDS…

The returns that can be generated from bond investments are influenced mainly by two factors:

Rate of interest offered on the bond and the rate of inflation

- *Time value of Money – interest rate and inflation rate.*
- *Cash flows expected on – Coupon payment dates and Redemption of Principal.*
- *Valuation of a bond involves discounting of the cash flows to the present point in time.*
- *Value of Bond P= c1/(1+r) + c2/(1+r)2….. +cn/ (1+r)n — where c1, c2 are cash flows expected from bond and r is the discount rate of cash flows.*

CONVENTIONS

- For calculation of interest following conventions are generally followed in the market:
- 1. Actual / 365
- 2. 30 / 360
- 3. Actual / 360
- 4. Actual / Actual

VALUATION OF BONDS…

5year bond at 10% - Discounted at 8, 10 and 12				
year	cassh flow	pv at 8	pv at 10	pv at 12
1	10	9.26	9.09	8.93
2	10	8.57	8.26	7.97
3	10	7.94	7.51	7.12
4	10	7.35	6.83	6.36
5	110	74.86	68.30	62.42
		107.99	100.00	92.79

VALUATION OF BONDS…

- *The value of Bond will move towards 100 – irrespective of the premium or discount paid at the time of purchase.*
- *Value of Bond will change with time even if the required rate do not change.*
- *A bond with specific coupon will have different prices at various required rates*

YIELD…

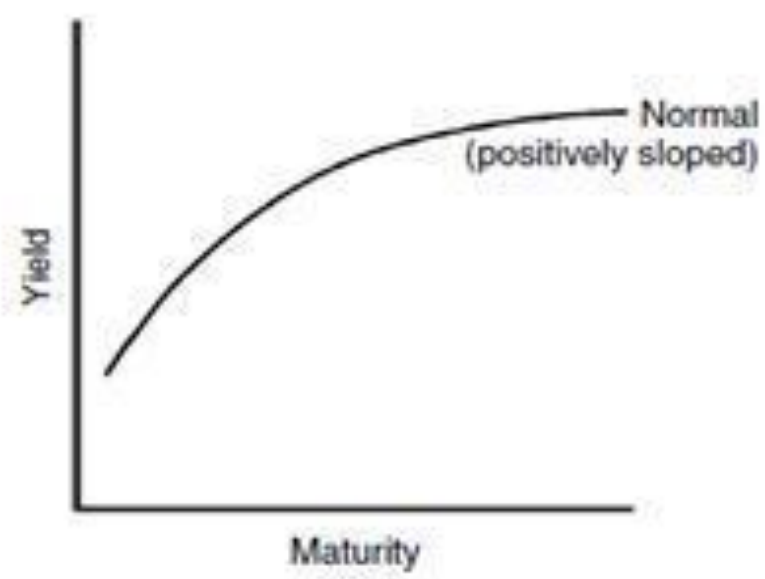
- *Current Yield – was popular till 1990…*
- *Current yield = Annual coupon receipts/ Market price of the bond.*
- *12.5% bond at 104.50 price, CY = 12.5*100/104.50 = 11.96*
- *YTM - Yield To Maturity – is based on the equation, the value of bond is the discounted present value of the expected future cash flows of the bond.*
- *YTM is Rate at which future cash flows of a bond is discounted to arrive at present value.*
- *If we buy 11.99% - 9 year bond at 108, then 108 = 5.995/(1+r)…+ 5.995/(1+r)18. YTM will be 10.58%*

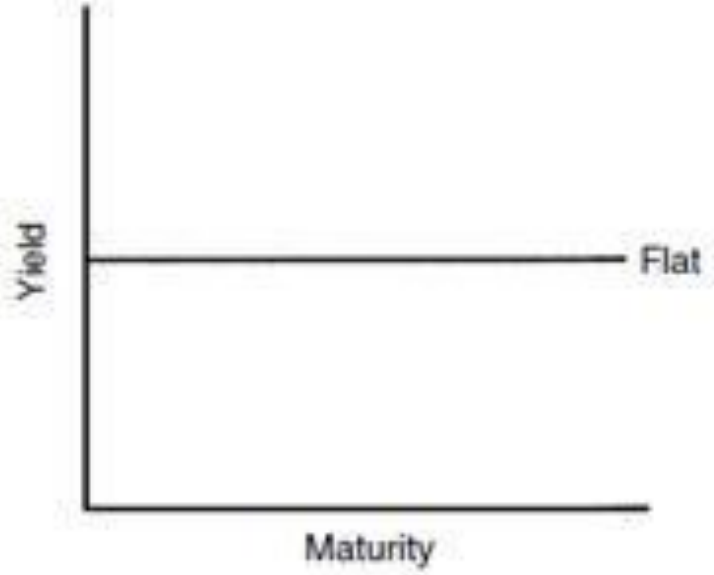
YIELD CURVE…

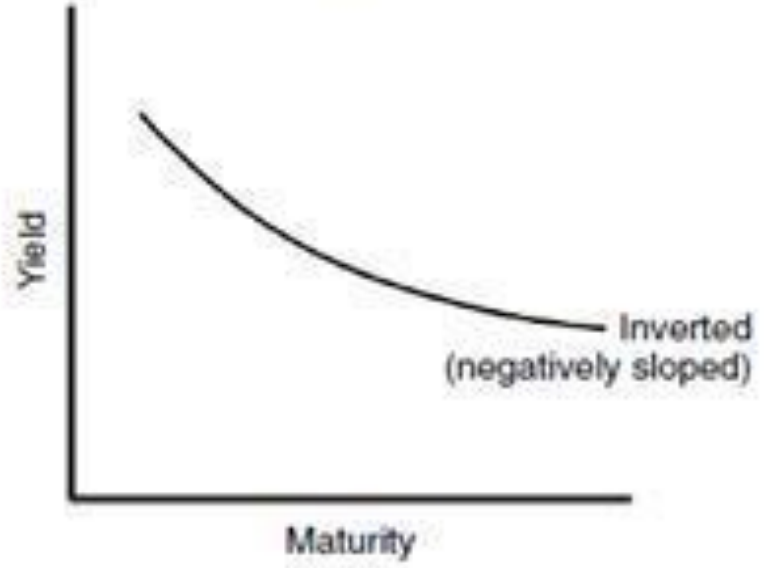
- *Plotting of yield for various maturities (bench mark) will represent the Yield Curve.*

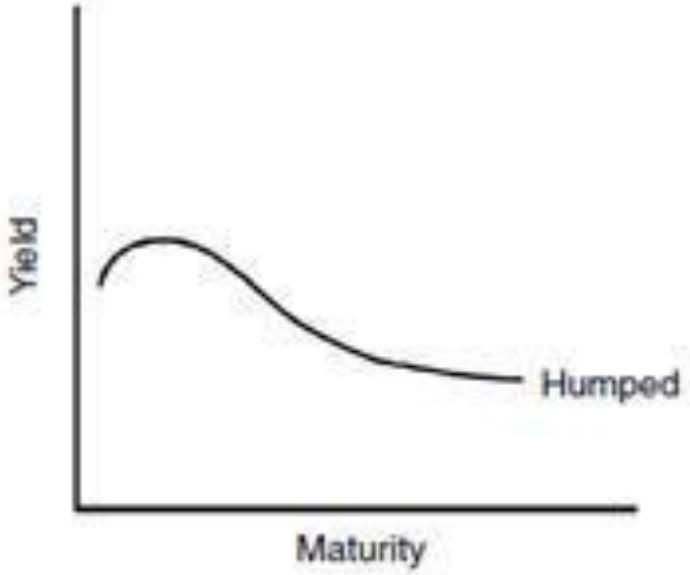
Types of yield curves…

- ***Normal or upward sloping***
- ***Flat***
- ***Negative or inverted***
- ***Humped***


Yield
Normal
(positively sloped)
Maturity


Yield
Flat
Maturity


Yield
Inverted
(negatively sloped)
Maturity


Yield
Humped
Maturity

CONVEXITY

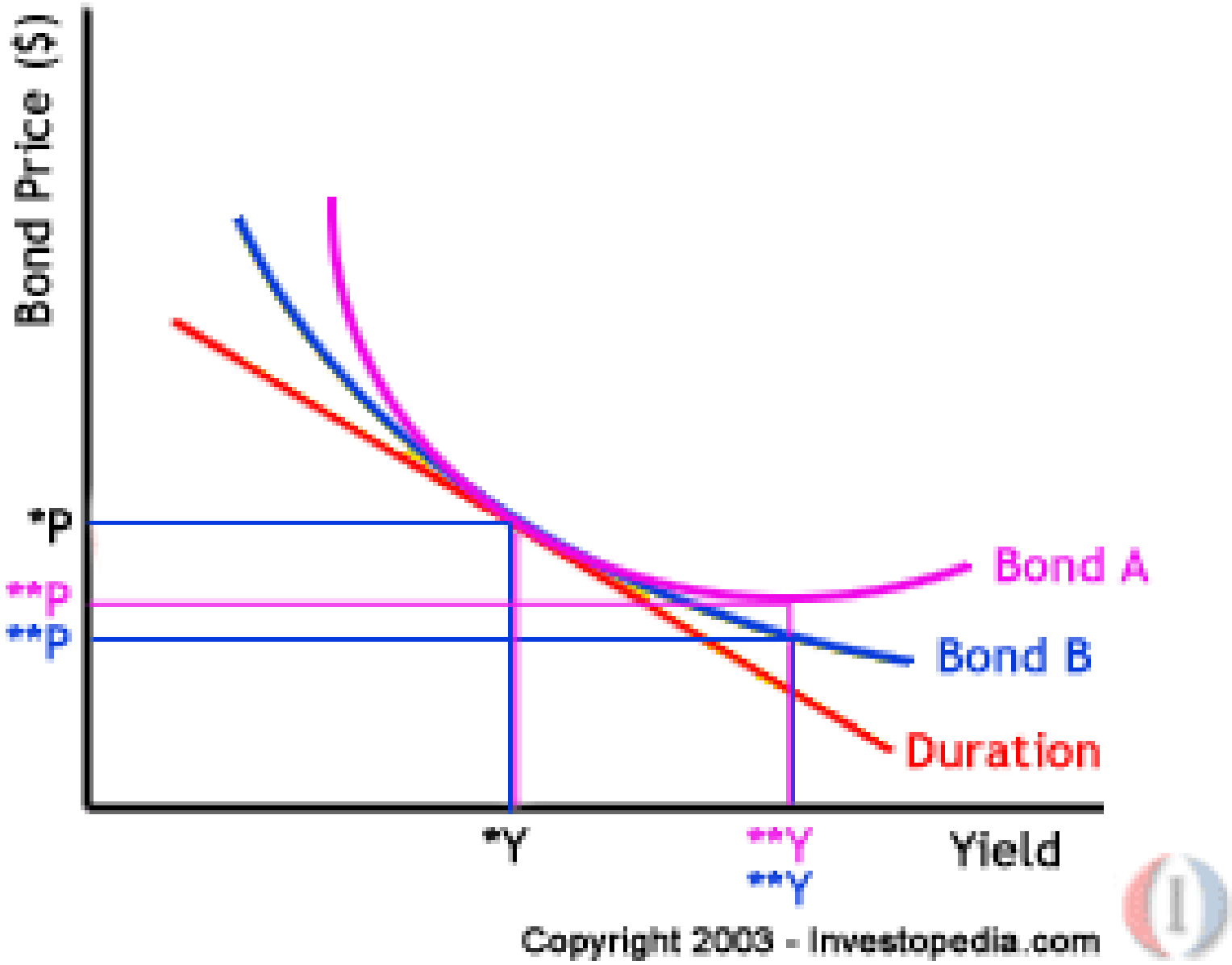
- For any given bond, a graph of the relationship between price and yield is convex. This means that the graph forms a curve rather than a straight -line (linear). The degree to which the graph is curved shows how much a bond's yield changes in response to a change in price.

Factors affecting convexity :-

- 1) The graph of the price -yield relationship for a plain vanilla bond exhibits positive convexity. The price-yield curve will increase as yield decreases, and vice versa. Therefore, as market yields decrease, the duration increases (and vice versa)
- 2) In general, the higher the coupon rate, the lower the convexity of a bond. Zero-coupon bonds have the highest convexity.

CONVEXITY

- The convexity calculation, therefore, accounts for the inaccuracies of the linear duration line. The main thing to remember about convexity is that it shows how much a bond's yield changes in response to changes in price. Convexity is also useful for comparing bonds. If two bonds offer the same duration and yield but one exhibits greater convexity, changes in interest rates will affect each bond differently. A bond with greater convexity is less affected by interest rates than a bond with less convexity. Also, bonds with greater convexity will have a higher price than bonds with a lower convexity, regardless of whether interest rates rise or fall.


Bond Price ($)
*P
**P
**P
Bond A
Bond B
Duration
*Y
**Y
**Y
Yield
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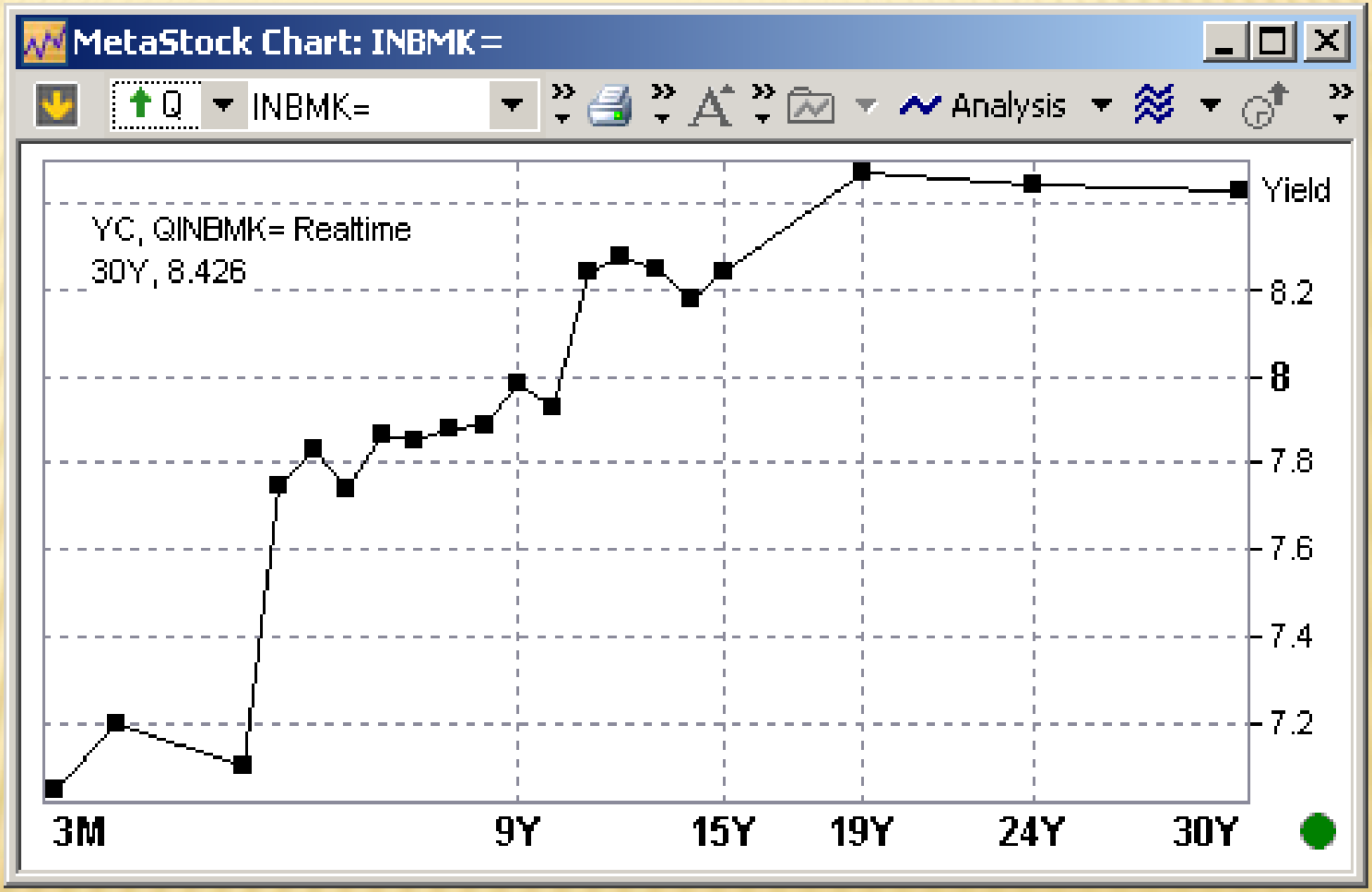
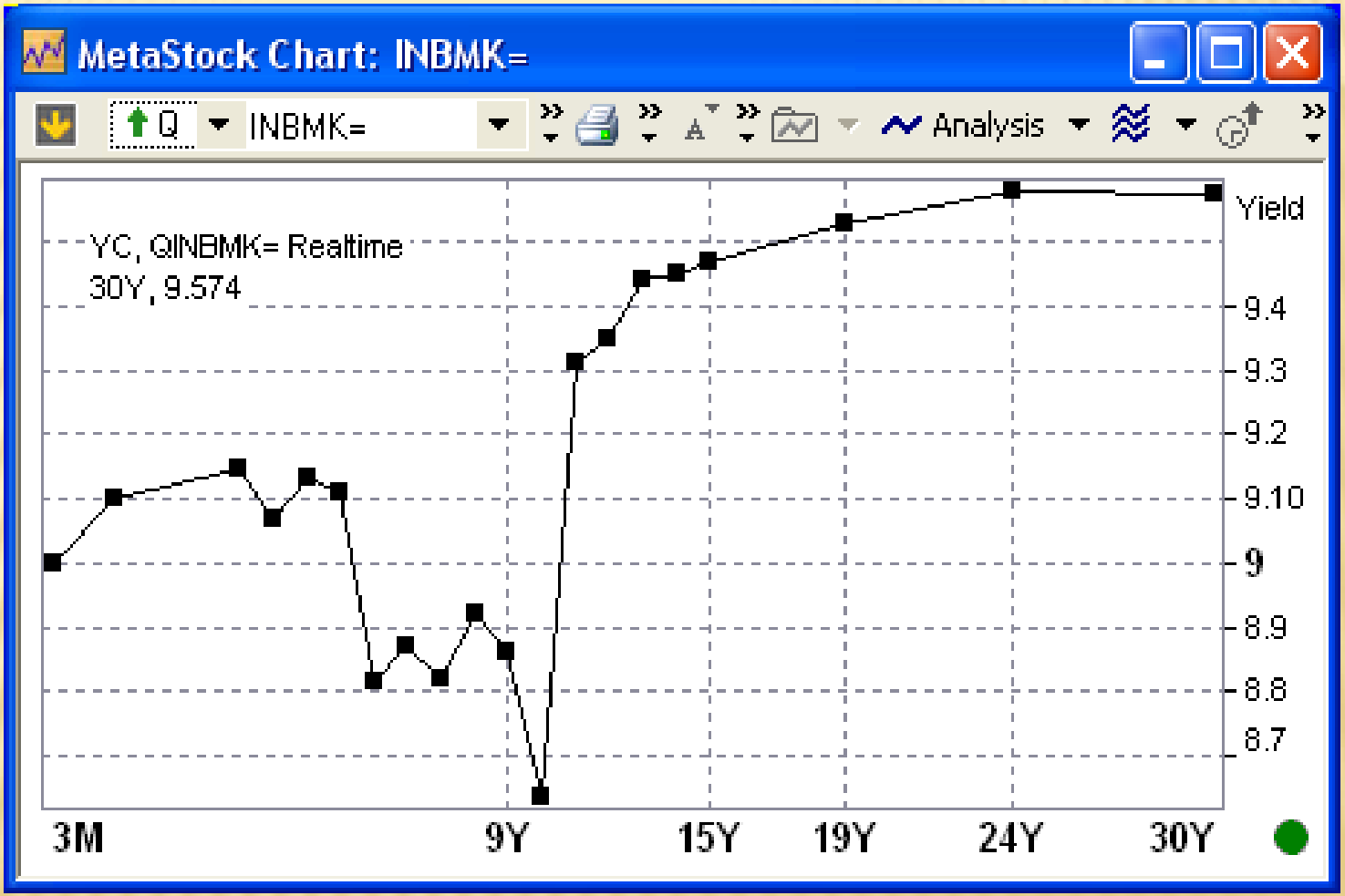
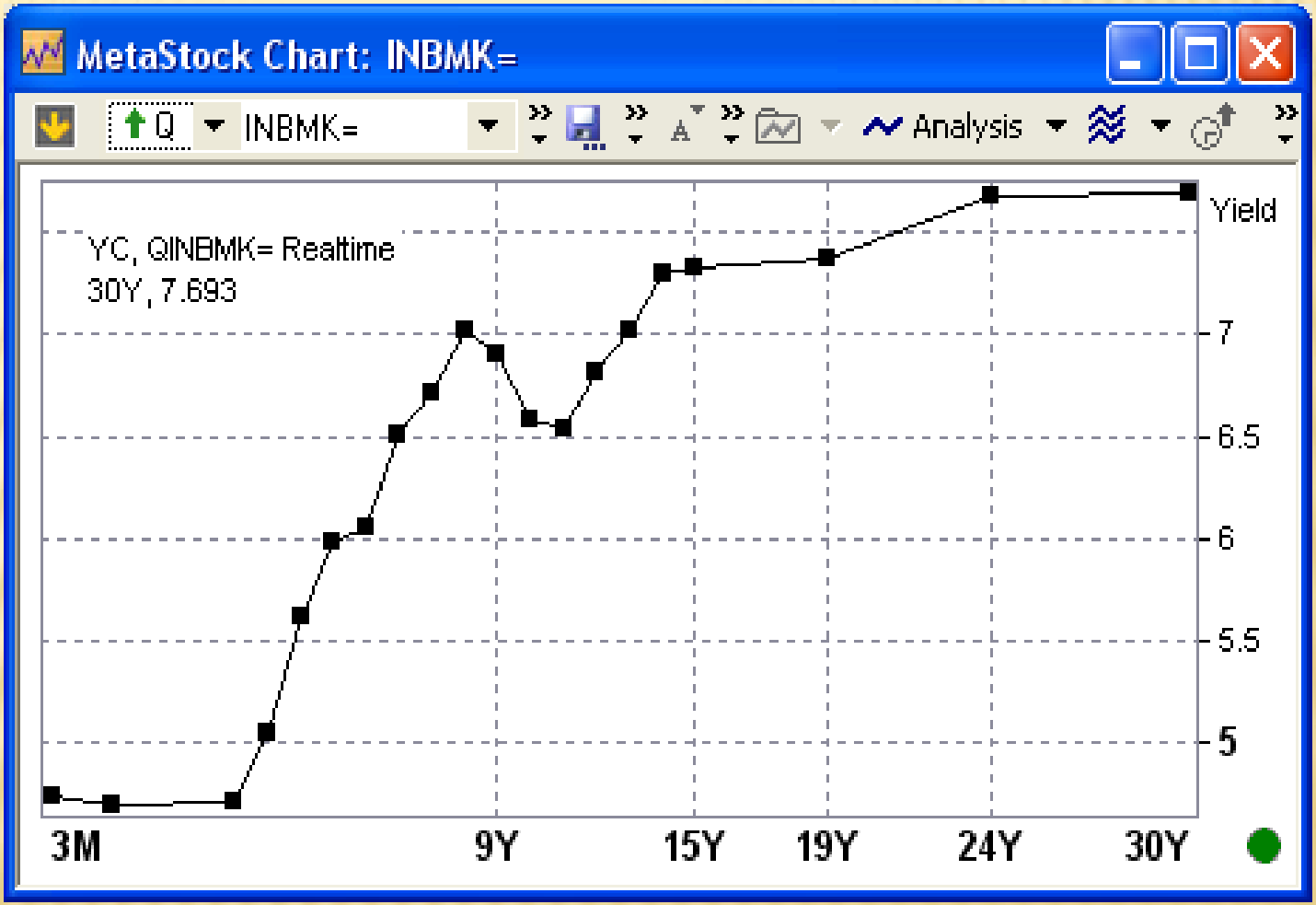
YIELD CURVE – APR08



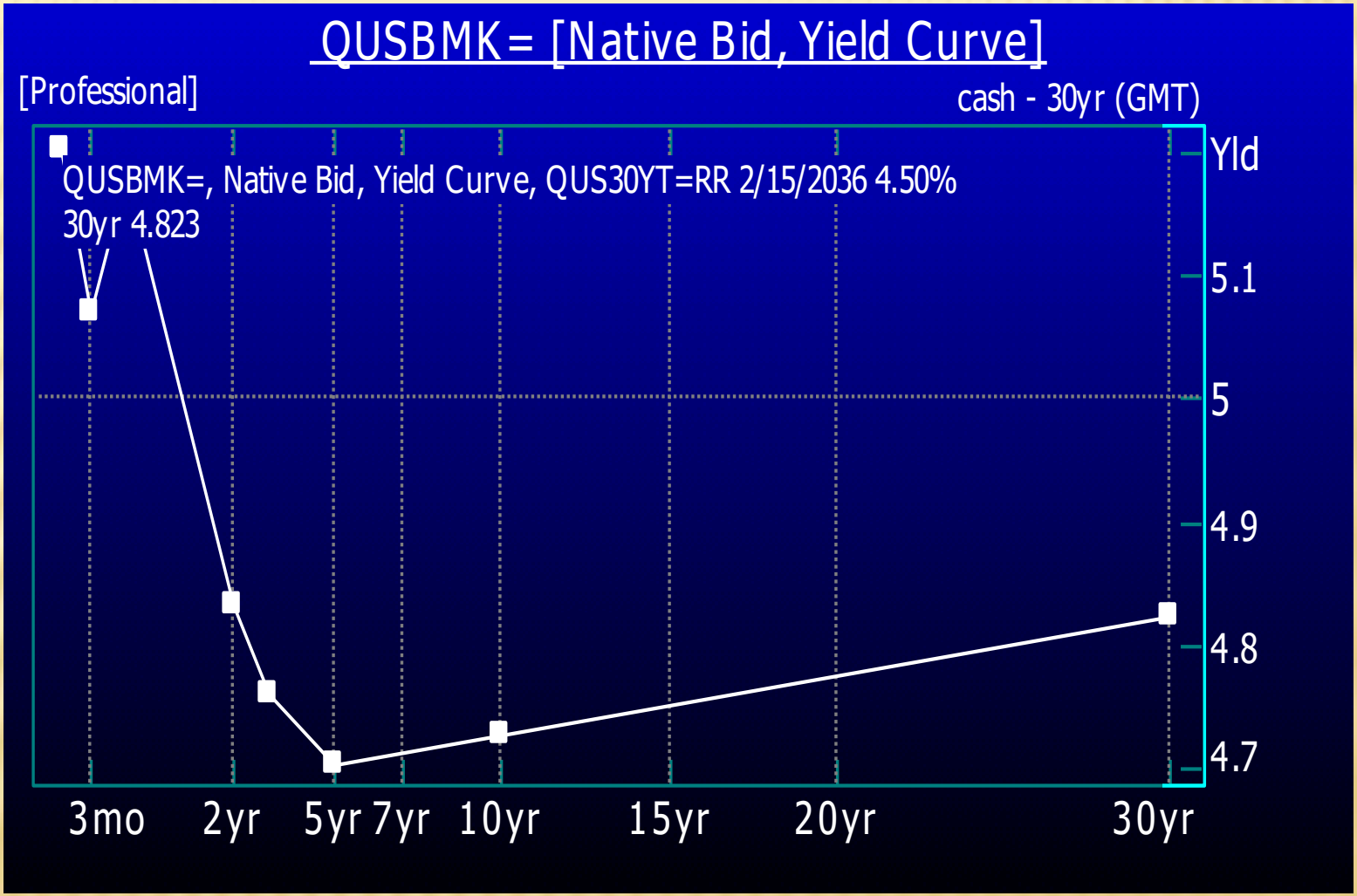
YIELD CURVE – SEP08



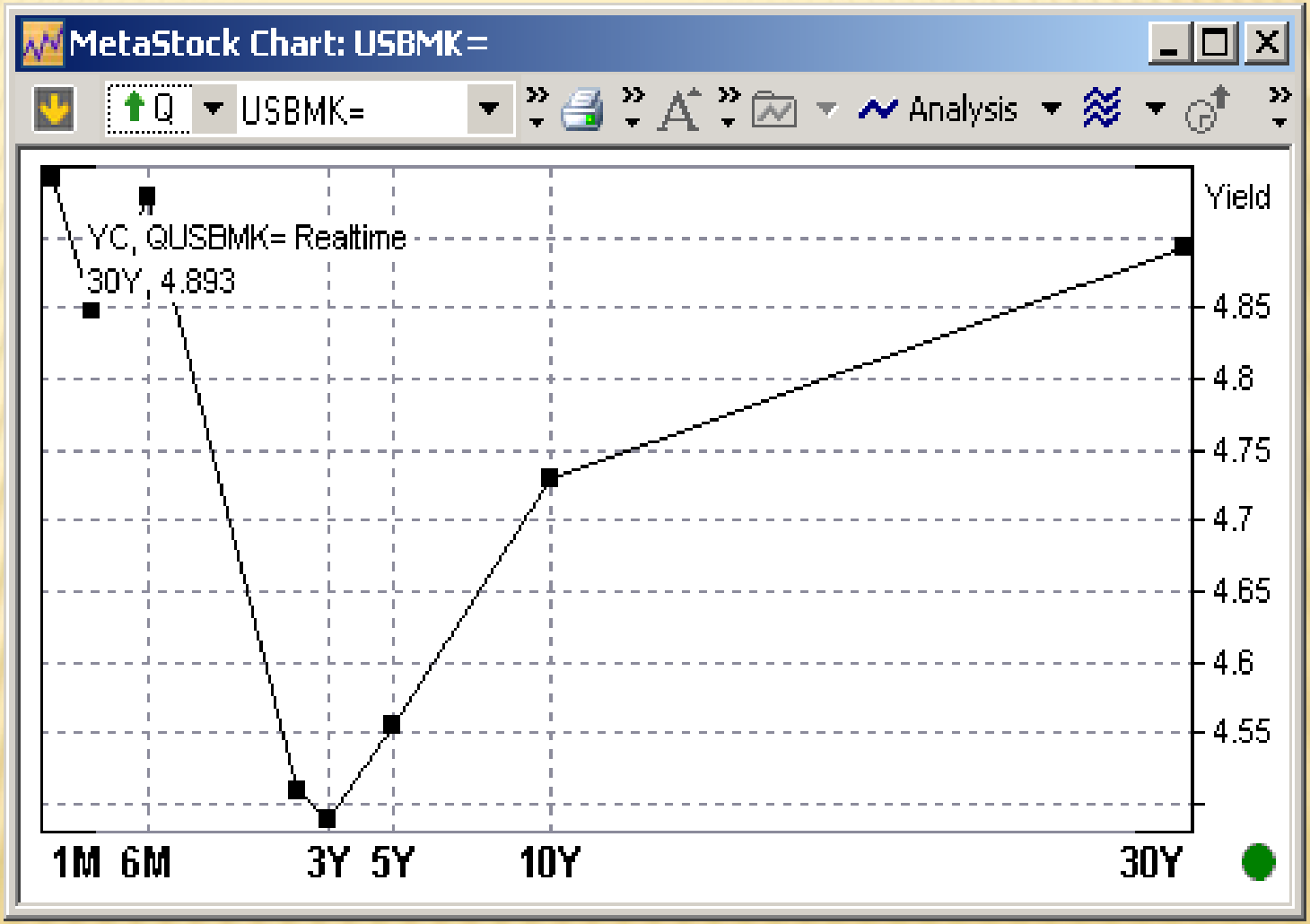
YIELD CURVE –FEB09



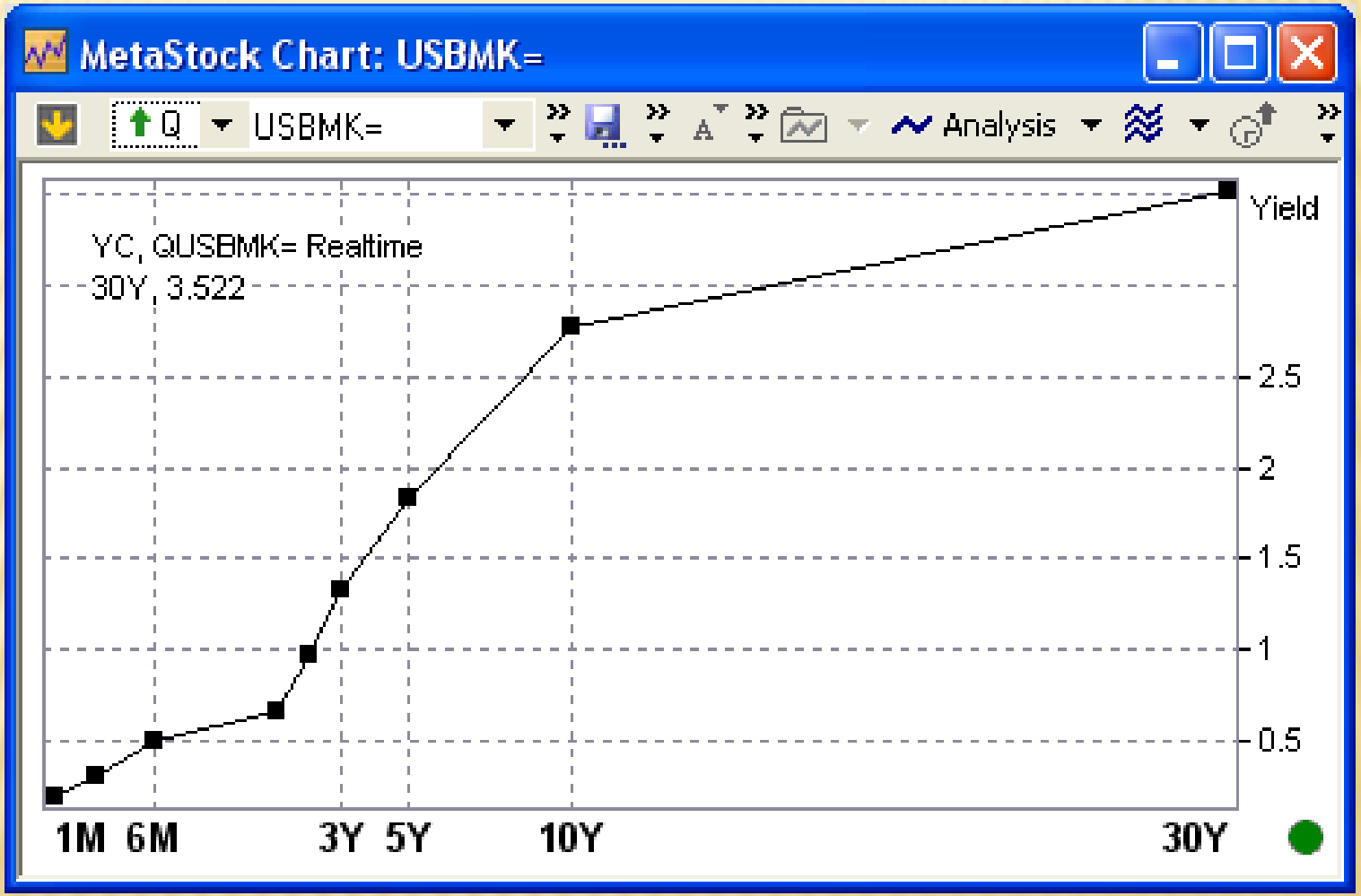
YIELD CURVE..US - 2006



YIELD CURVE..US 2007



Yield Curve..USFeb09



Durations……

- *Duration is measured in years; - It is the weighted Average period to receive all future cash flows in a Bond*
- *Duration is a point in the time horizon where price risk is offset by reinvestment risks.*
- *Modified duration is % change in Px for a Unit change in interest rate.*

5year bond at 10% - Discounted at 8, 10 and 12								
year	coupon	pv at 8	pv at 10	pv at 12		YR *PV	YR *PV	YR *PV
1	10	9.26	9.09	8.93		9.26	9.09	8.93
2	10	8.57	8.26	7.97		17.15	16.53	15.94
3	10	7.94	7.51	7.12		23.81	22.54	21.35
4	10	7.35	6.83	6.36		29.40	27.32	25.42
5	110	74.86	68.30	62.42		374.32	341.51	312.08
	PX	107.99	100.00	92.79	SUM	453.94	416.99	383.73
					D	4.203743	4.169865	4.135462
					MD	3.892355	3.790787	3.692377

Accounting norms…..

- *Classification of portfolio into Held To Maturity, Available For Sale and Held For Trading..*
- *Banks to decide category of Investment at the time of acquisition and recorded in the proposal.*
- *Investments can be shifted to/from HTM once a year – with the approval of the Board.*
- *Transfer should be at Cost/ book value or market value – whichever is least on the date of transfer.*