

INTEREST RATE FORWARDS AND FUTURES



FORWARD RATES

The forward rate is the future zero rate implied by today's term structure of interest rates

IMPLIED FORWARD RATE

- ▶ An investor investing 2 years has a choice of buying a 2 year zero coupon bond paying $(1+R_{0,2})^2$ or buying a 1 year bond paying $(1+R_{0,1})$ for 1 year , and reinvesting the proceeds at the implied forward rate, $R_{1,2}$ between years 1 and 2. The forward rate makes the investor indifferent between these alternatives. That is to say,

$$(1 + R_{0,1})(1 + R_{1,2}) = (1 + R_{0,2})^2$$

$$(1 + R_{1,2}) = \frac{(1 + R_{0,2})^2}{(1 + R_{0,1})}$$

IMPLIED FORWARD RATE

- ▶ In general, we have

$$(1 + R_{t_1, t_2})^{t_2 - t_1} = \frac{(1 + R_{0, t_2})^{t_2}}{(1 + R_{0, t_1})^{t_1}} = \frac{P(0, t_1)}{P(0, t_2)}$$

- ▶ This further implies, the implied forward zero-coupon bond price must be consistent with the implied forward interest rate.

$$P(t_1, t_2) = \frac{1}{(1 + R_{t_1, t_2})^{t_2 - t_1}} = \frac{P(0, t_2)}{P(0, t_1)}$$

FORMULA FOR FORWARD RATES (CONTINUOUS CASE)

- ▶ Suppose that the zero rates for maturities T_1 and T_2 are R_1 and R_2 with both rates continuously compounded.
- ▶ The forward rate for the period between times T_1 and T_2 is

$$\frac{R_2 T_2 - R_1 T_1}{T_2 - T_1}$$

$$R_F = R_2 + (R_2 - R_1) \frac{T_1}{(T_2 - T_1)}$$

CALCULATION OF FORWARD RATES

Year (n)	Zero Rate for an n -year Investment (% per annum)	Forward Rate for n th Year (% per annum)
1	10.0	
2	10.5	11.0
3	10.8	11.4
4	11.0	11.6
5	11.1	11.5

- ▶ To illustrate this formula, consider the five year forward rate from the data in our table. $T_4 = 11\%$,

$$T_5 = 11.1\%$$

$$R_5 = .111 + (.111 - .11) \frac{4}{5 - 4} = .115$$

This shows that if zero rate is upward sloping between T_1 and T_2 , so that $R_2 > R_1$, then $R_F > R_2$

INSTANTANEOUS FORWARD RATE

- ▶ The instantaneous forward rate for a maturity T is the forward rate that applies for a very short time period starting at T . It is

$$R_F = R + T \frac{\partial R}{\partial T}$$

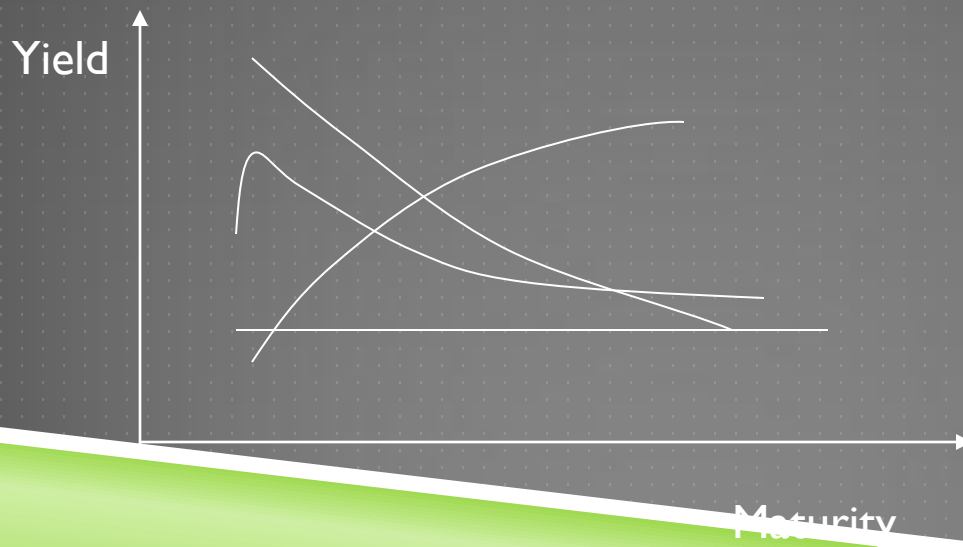
where R is the T -year rate. If we define $P(0, T)$ as the price of bond maturing at time T and paying \$1, so that

$$P(0, T) = e^{-RT}$$

$$R_F = -\frac{\partial}{\partial T} P(0, T)$$

TERM STRUCTURE OF INTEREST RATES

- ▶ The *term structure of interest rates* (or *yield curve*) is the relationship of the yield to maturity against bond term (maturity).
- ▶ Typical shapes are: increasing (normal), decreasing, humped and flat.



UPWARD VS DOWNWARD SLOPING YIELD CURVE

- ▶ For an upward sloping yield curve:

Fwd Rate > Zero Rate > Par Yield

- ▶ For a downward sloping yield curve

Par Yield > Zero Rate > Fwd Rate

THEORIES OF THE TERM STRUCTURE

- ▶ A number of theory have been proposed: *Expectation Hypothesis, Liquidity Preference Theory, Preferred Habitats Theory, Segmentation Hypothesis.*
- ▶ Fabozzi (1998): *Pure Expectation Hypothesis, Liquidity Preference Theory, Preferred Habitats Theory* are different forms of the expectation theory ==> two major theories: *expectation theory* and *market segmentation theory.*

THEORIES OF THE TERM STRUCTURE OF INTEREST RATES (I)

- ▶ *The Pure Expectation Hypothesis*: Implied forward rates are unbiased expectations of future spot rates \implies a rising term structure indicate that market expects short-term rates to rise in the future; a flat term structure reflects expectations that the future short term structure will be constant; and so on; Hicks (1937). Problems: It neglects the risks inherent in investing in bonds: if forward rates were perfect predictors of future interest rates then the future prices of bonds will be known with certainty.
- ▶ *The Liquidity Preference Theory* (Keynes): Given that there is uncertainty, long bonds should have higher returns than short bonds \implies we should expect a risk premium arising out from investors *liquidity preferences*. It is consistent with the empirical results that yield curves are upward sloping \implies positive risk premium.

THEORIES OF THE TERM STRUCTURE OF INTEREST RATES (2)

- ▶ *The Preferred Habitat Theory*: It adopts the view that the term structure is composed by two components: Expectations plus risk premium (= liquidity preference theory). However, the risk premium might be negative as well as positive to induce market participants to shift out of their preferred habitat (Modigliani & Sutch (1966)).
- ▶ *The Segmentation Hypothesis* (Culbertson (1957)): It also recognises that investors have preferred habitat (= preferred habitat theory) ==> individuals have strong maturity preferences ==> there need be no relationship between bonds with different maturities ==> bonds with different maturities are traded in different markets.

FORWARD RATE ARRANGEMENTS

- ▶ We now consider the problem of a borrower who wishes to hedge against increases in the cost of borrowing.
- ▶ Consider a firm expecting to borrow \$100m for 91 days, beginning 120 days from today, in December. The loan will be repaid in March.
- ▶ Suppose that the effective quarterly interest rate can be either be 1.5% or 2%, and the implied September 91-day forward rate is 1.8%.
- ▶ Depending on the interest rate, there is a variation of \$0.5m in the borrowing cost. How can we hedge this uncertainty?

FORWARD RATE AGREEMENT

- ▶ A forward rate agreement (FRA) is an agreement that a certain rate will apply to a certain principal during a certain future time period
- ▶ A FRA is equivalent to an agreement where interest at a predetermined rate, R_K is exchanged for interest at the market rate
- ▶ An FRA can be valued by assuming that the forward interest rate is certain to be realized
- ▶ FRAs are forward contract based on the interest rate, and as such do not entail the actual lending of money. Rather, the borrower who enters an FRA is paid if a reference rate is above the FRA rate, and the borrower pays if the reference rate is below the FRA rate.
- ▶ The actual borrowing is conducted by the borrower independently of the FRA.

FORWARD SETTLEMENT IN ARREARS

- ▶ Consider what happens if the FRA is settled in March, on day 211, the loan repayment date. In that case, the payment to the borrower should be

$$(R_{quarterly} - R_{FRA}) \times \text{Notional Principle}$$

- ▶ If the borrowing rate is 1.5%

$$(0.015 - 0.018) \times \$100m = -\$300,000$$

- ▶ Since the rate is lower than FRA rate, the borrower pays the FRA counterparty.

FRA SETTLEMENT IN ARREARS

- ▶ If the borrowing rate turns out to be 2%, the payment under FRA should be

$$(0.02 - 0.018) \times \$100m = \$200,000$$

- ▶ What if the settlement occurs at the time of borrowing? If the FRA is settled in December, at the time of the money borrowed, payments will be less than when settled in arrears because the borrower has time to earn interest on the FRA settlement.

FRA SETTLEMENT AT THE TIME OF BORROWING

- ▶ The payment for a borrower is

$$\text{Notional Principle} \times \frac{R_{quarterly} - R_{FRA}}{(1 + R_{quarterly})}$$

- ▶ If $r=1.5\%$, then payment in December is

$$\frac{-\$300,000}{1 + 0.015} = -\$295,566.5$$

- ▶ The future value of this is $-\$300,000$. In order to make this payment, the borrower can borrow an extra $\$295,566.5$, which results in an extra $\$300,000$ loan payment in March.
- ▶ If $r=2\%$, then the payment is $\$196,078.43$. The borrower can invest this amount, which gives $\$200,000$ in March.

FORWARD RATE AGREEMENT (CONTINUED)

- ▶ Consider a FAR where company X is agreeing to lend money to company

- ▶ Value of a FRA:

$$V = L(R_K - R_F)(T_1 - T_2)e^{-R_2T_2}$$

- ▶ Example:
- ▶ 3-month LIBOR is 5%, 6-month LIBOR is 5.5%. Consider a FRA where you will receive 7% rate with quarterly compounding on a principal of \$1 Million between 3 months and 6 months. The forward rate is 6.0452% (try to compute it). The value of the FRA is

$$1,000,000 * (0.07 - 0.060452) * (0.25) * \exp(-0.055 * 0.5) = \$2,322$$

INTEREST RATE FUTURES

- ▶ Treasury Bond Futures
- ▶ Eurodollar Futures

DAY COUNT AND QUOTATION CONVENTION

- ▶ The day count defines in which interest accrues over time.
- ▶ The interest earned between the periods can be defined as

$$\frac{\text{nb of days btw dates}}{\text{nb of days in reference period}} \times \text{interest earned in reference period}$$

- ▶ Actual/ actual (tbond) or 30/360 (municipal bond) or Actual/360 (money market instruments)
- ▶ For treasury bond actual/actual day count convention is used

DAY COUNT AND QUOTATION

- ▶ Assume bond principal \$100, coupon payment dates are March 1 and September 1, the coupon rate 8%, what will be the interest earned between March 1 and July 3?

$$\frac{124}{184} \times 4 = 2.6957$$

PRICE QUOTATIONS

- ▶ Define P is quoted price(or annualized discount yield), Y is the cash price, n is the remaining life of the bond, then

$$P = \frac{360}{n}(100 - Y)$$

$$Y = 100 - P \frac{n}{360}$$

US TREASURY BONDS

- ▶ Quoted in dollars and thirty-seconds of a dollar for a bond with a face value of \$100.
- ▶ A quote of 95.16 indicates that the quoted price for a bond with a face value of \$100,000 is \$95,500.
- ▶ Quoted price (clean price) is not the same as cash price (dirty price) paid by the purchaser of the bond.

Cash Price = Quoted Price + Accrued interest since last coupon date

- ▶ *Example:* Suppose it is September 30, 2009 and the bond under consideration is an 5% coupon bond maturing in January 10, 2020, with a quoted price of 95.16. Because coupons paid semiannually, the most recent coupon date is July 10, 2009 and next one is January 10, 2010. The number of days between July 10, 2009 and September 30, 2009 is 82, whereas the number of day between July 10, 2009 and January 10, 2010 is 184.

US TREASURY BOND

- ▶ On a bond with face value of \$100, the coupon payment is \$2.5 on July 10 and January 10. The accrued interest on September 30, 2009 is the share of January 2010 coupon accruing to the bondholder on September 30, 2009. Because actual/actual in period is used for Tbond, this is \$1.114. The cash price per \$100 face value for the bond is therefore $\$95.5 + 1.114 = 96.61$, which implies the cash price for \$100,000 bond is \$96,610.

TREASURY BOND FUTURES

- ▶ T-bond futures contract allows the party with the short position to choose to deliver any bond that has a maturity of more than 15 years and is not callable within 15 years.

Cash price received by party with short position =

Quoted futures price \times Conversion factor + Accrued interest

CONVERSION FACTOR

The conversion factor for a bond is approximately equal to the value of the bond on the assumption that the yield curve is flat at 6% with semiannual compounding

CONVERSION FACTOR

- ▶ 10% coupon bond with 20 years and 2 months to maturity. For the purpose of computing the conversion factor we assume that the maturity is 20 years. The first coupon payment is assumed to be made after 6 months from now. Face value is \$100. When the discount rate is 6% per annum with semiannual compounding (or 3% for 6 months), the value of the bond is:

$$\sum_{i=1}^{40} \frac{5}{1.03^i} + \frac{100}{1.03^{40}} = 146.23$$

- ▶ Dividing by the face value, gives us the conversion factor:
1.4623

CBOT T-BONDS & T-NOTES

Factors that affect the futures price:

- ▶ Delivery can be made any time during the delivery month
- ▶ Any of a range of eligible bonds can be delivered
- ▶ The wild card play

CHEAPEST TO DELIVER BOND

- ▶ At any given time during the delivery month, there are many bonds that can be delivered in the CBOT Tbond futures contract. The party with the short position can choose which of the available bonds is cheapest to deliver.
- ▶ If bond yield $> 6\%$, the delivery of low-coupon long maturity bonds.
- ▶ If bond yield $< 6\%$, the delivery of high coupon short maturity bonds.

WILD CARD

- ▶ Trading in the CBOT T-Bonds futures ceases at 2:00 PM Chicago time. However, the underline asset (T-Bonds) continue trading till 4:00 PM.
- ▶ A trader with short position in the futures contract has till 8:00 PM to issue to the Clearing House a notice of intention to deliver. In this case, the invoice price is calculated on the basis of the settlement price that day.
- ▶ If bond prices decline after 2:00 PM the party with the short position may issue a notice of intention to deliver and buy in the spot market cheaper bonds. This option is called: *wild card play*.
- ▶ This option is NOT free. Futures prices are lower to incorporate the option value.

EURODOLLAR FUTURES

- ▶ Eurodollars are deposits denominated in US Dollars at any non-US bank account.
- ▶ Eurodollar futures based on these deposits
- ▶ Eurodollar strip (the set of futures prices with different maturities at one point in time) provides basic interest rate information that is commonly used to price other futures contract and to price swaps.
- ▶ Traded in CME
- ▶ Size of the contract is \$1m 3 month Eurodollar time deposits
- ▶ It is cash settled
- ▶ Settlement: $100 - \text{LIBOR}$ (Annualized 3 month USD LIBOR)

EURODOLLAR FUTURES

- ▶ Suppose that current LIBOR is 1.5% over three month.
- ▶ By convention, this is annualized by multiplying by 4.
- ▶ Assume that a bank borrows \$1m for 3 month, a change in annualized LIBOR of 0.01%(1 basis point) would rise borrowing cost by $0.0001/4 * \$1m = \25
- ▶ It is important to know that Eurodollar contract settles based on current LIBOR, which is the interest rate quoted for the next three months.

EURODOLLAR FUTURES

- ▶ Can be used to hedge interest rate risk.
- ▶ For a borrower, a short position in the contract is a hedge since it pays when interest rate rises and requires payment when interest rate falls.
- ▶ Suppose you are going to borrow \$1m 7 months from now at LIBOR rate for 3 months. Assume 7 months from today Eurodollar futures price is 94; this implies quarterly effective interest rate of 1.5%.
- ▶ Now suppose that 7 months hence, 3 month LIBOR is 8%. The implied 3 month 90-day interest rate is 2%. Our extra borrowing expense will be $(0.02 - 0.015) * \$1m = \5000 .

EURODOLLAR FUTURES

- ▶ This extra borrowing costs is offset by gains on the Eurodollar contract. The Eurodollar contract price has gone down from 94 to 92, giving us gain of \$25 per basis point, or $25 * 100 * (94 - 92) = \$5,000$.
- ▶ The short position in futures contract compensates us for the increase in our borrowing cost.
- ▶ A long position can be used to lock in a lending rate.

EURODOLLAR FUTURES

- ▶ Similar to FRA
- ▶ They can be used to guarantee a borrowing rate
- ▶ However, there are important differences as well.
- ▶ Let's consider our earlier example in which we wish to guarantee a borrowing rate for a \$100m loan from December to March. Suppose December Eurodollar futures price is 92.8. Implied 3-month LIBOR is $(100-92.8)/4=1.8\%$.
- ▶ The payoff on a single short Eurodollar contract at expiration is

$$(92.8 - (100 - LIBOR)) \times 25 \times 100$$

EURODOLLAR FUTURES

- ▶ Thus the payoff on the Eurodollar contract compensates us for the difference between the implied rate and actual rate at expiration.
- ▶ Consider hedging with this contract, suppose two possible 3-month borrowing rates in December, 1.5% and 2%. If the interest rate is 1.5%, then borrowing cost on \$100m will be \$1.5m, if the interest rate is 2%, then borrowing cost will be \$2m.
- ▶ Now consider we were to short 100 Eurodollar futures contract. If the 3-month rate in December is 1.5%, the Eurodollar futures price will be 94.

EURODOLLAR FUTURES

- ▶ The payment is

$$[(92.8 - 94) \times 100 \times \$25] \times 100 = -\$300,000$$

- ▶ If the borrowing rate is 2%, we have

$$[(92.8 - 92) \times 100 \times \$25] \times 100 = \$200,000$$

- ▶ This is like the payment on an FRA paid in arrears, except that the futures contract settles in December, but our interest expense is not paid until March. Thus we have three months to earn or pay interest on our Eurodollar gain or loss before we actually make the interest payments.

EURODOLLAR FUTURES

- ▶ Remember, when the FRA settles on the borrowing date, the payment is the present value of the change in borrowing cost. The FRA is thus tailed automatically as part of the agreement.
- ▶ Eurodollar contract position should be tailed separately. We do this by shorting less than 100 contracts, using the implied 3-month Eurodollar rate of 1.8% as our discount factor.

$$\text{Number of Eurodollar contracts} = -\frac{100}{1 + 0.018} = -98.2318$$

EURODOLLAR FUTURES

- ▶ Now consider the gain on the Eurodollar futures position. If LIBOR=6%, our total gain on the short contract when we initiate borrowing on day 120 will be

$$98.2318 \times (92.8 - 94) \times \$2500 = -\$294,695$$

- ▶ If LIBOR=8%, our total gain on the contracts will be

$$98.2318 \times (92.8 - 92) \times \$2500 = \$196,464$$

- ▶ We can now invest these proceeds at the prevailing interest rate until March. If LIBOR=6%, we save \$300,000 in borrowing cost, the proceeds from the Eurodollar contract are $-\$294,695 \times (1.015) = -\$299,115$. If LIBOR=8%, we owe an extra \$200,000 in interest and the invested proceeds from Eurodollar contract are $\$196,464 \times (1.02) = \$200,393$.

EURODOLLAR FUTURES VS FRA

- ▶ The rate implied by the Eurodollar contract cannot equal the prevailing FRA rate for the same loan. The difference between the FRA rate and Eurodollar rate is called convexity bias.

$$\text{Forward rate} = \text{Futures rate} - \frac{1}{2} \sigma^2 T_1 T_2$$

where T_1 is the time to maturity of futures contract, T_2 is the time to maturity of the rate underlying the futures contract. The variable σ is the standard deviation of the change in the short term interest rate in 1 year.

DURATION AND CONVEXITY

- ▶ Duration is the sensitivity of bond's price to interest rate changes and tells us approximately how much bond's price will change for a given change in the bond's yield.
- ▶ Convexity measures the extend to which duration changes as the bond's yield changes

DURATION

- ▶ A measure of the average life of an investment (controversial).
- ▶ For a zero coupon bond the duration is the period of time remaining until the bond matures. For a coupon bond the duration is less than the term to maturity since interest is being paid back each six months.
- ▶ Macaulay argued that the best descriptive measure of a bonds average life should consider all of the bond's cash flows as well as the time value of money.
- ▶ Duration is defined as the weighted average maturity of a bond's cash flows where the present values of the cash flows serve as the weights.
- ▶ If $PV(CF_t)$ is the present value of the cash flow received in period t , CF_t is the nominal cash flow received in t , TPV is the total present value of all the bonds future cash flows and t is the number of years remaining until maturity then Duration in years is equal to:

$$D = \frac{\sum(PV(CF_t) * t)}{TPV}$$

EXAMPLE OF DURATION

- ▶ We hold a bond with 4 years to maturity, which has a coupon rate of 8% and a current yield of 10%. Interest payments are received at the end of each year. The principal (100) is received at the end of the fourth year.
- ▶ Apply duration formula with $C_t = C$

$$D = \frac{\sum \frac{C * t}{(1+r)^t} + \frac{nF}{(1+r)^t}}{\sum \frac{C}{(1+r)^t}}$$

$$D = \frac{\frac{8}{1.1} + \frac{8 * 2}{(1.1)^2} + \frac{8 * 3}{(1.1)^3} + \frac{8 * 4}{(1.1)^4} + \frac{100 * 4}{(1.1)^4}}{\frac{8}{1.1} + \frac{8}{(1.1)^2} + \frac{8}{(1.1)^3} + \frac{8}{(1.1)^4} + \frac{100}{(1.1)^4}}$$

$$D = \frac{339.59}{93.66} = 3.56$$

DERIVATION OF DURATION MEASURE (I)

$$P = \frac{C}{1+r} + \frac{C}{(1+r)^2} + \dots + \frac{C}{(1+r)^n} + \frac{F}{(1+r)^n}$$

$$\frac{dP}{dr} = \frac{-C}{(1+r)^2} + \frac{(-2)C}{(1+r)^3} + \dots + \frac{(-n)C}{(1+r)^{n+1}} + \frac{(-n)F}{(1+r)^{n+1}}$$

$$\frac{dP}{dr} = -\frac{1}{1+r} \left[\frac{C}{1+r} + \dots + \frac{nC}{(1+r)^n} + \frac{nF}{(1+r)^n} \right]$$

$$\frac{dP}{dr} \frac{1}{P} = -\frac{1}{1+r} \left[\frac{C}{1+r} + \dots + \frac{nC}{(1+r)^n} + \frac{nF}{(1+r)^n} \right] \frac{1}{P}$$

DERIVATION OF DURATION MEASURE (2)

$$D = \frac{\frac{C}{1+r} + \frac{2C}{(1+r)^2} + \dots + \frac{nC}{(1+r)^n} + \frac{nF}{(1+r)^n}}{P}$$

$$D = \frac{\sum_1^n \frac{tC}{(1+r)^t} + \frac{nF}{(1+r)^t}}{P}$$

$$\frac{dP}{dr} \frac{1}{P} = -\frac{1}{1+r} D$$

DURATION MEASURE

- ▶ Duration is the discount rate elasticity of the bond price. It shows the percentage effect on price of a small percentage change in yield.

$$\frac{dP}{dr} = -\frac{DP}{1+r}$$

$$\frac{\frac{dP}{P}}{\frac{dr}{1+r}} = -D$$

DURATION IN THE BOOK

- ▶ Duration of a bond that provides cash flow c_i at time t_i is

$$\sum_{i=1}^n t_i \left[\frac{c_i e^{-yt_i}}{B} \right]$$

where B is its price and y is its yield (continuously compounded)

- ▶ This leads to Macaulay duration

$$\frac{\delta B}{B} = -D\delta y$$

DURATION (CONTINUED)

- ▶ When the yield y is expressed with compounding m times per year

$$\delta B = - \frac{BD\delta y}{1 + y/m}$$

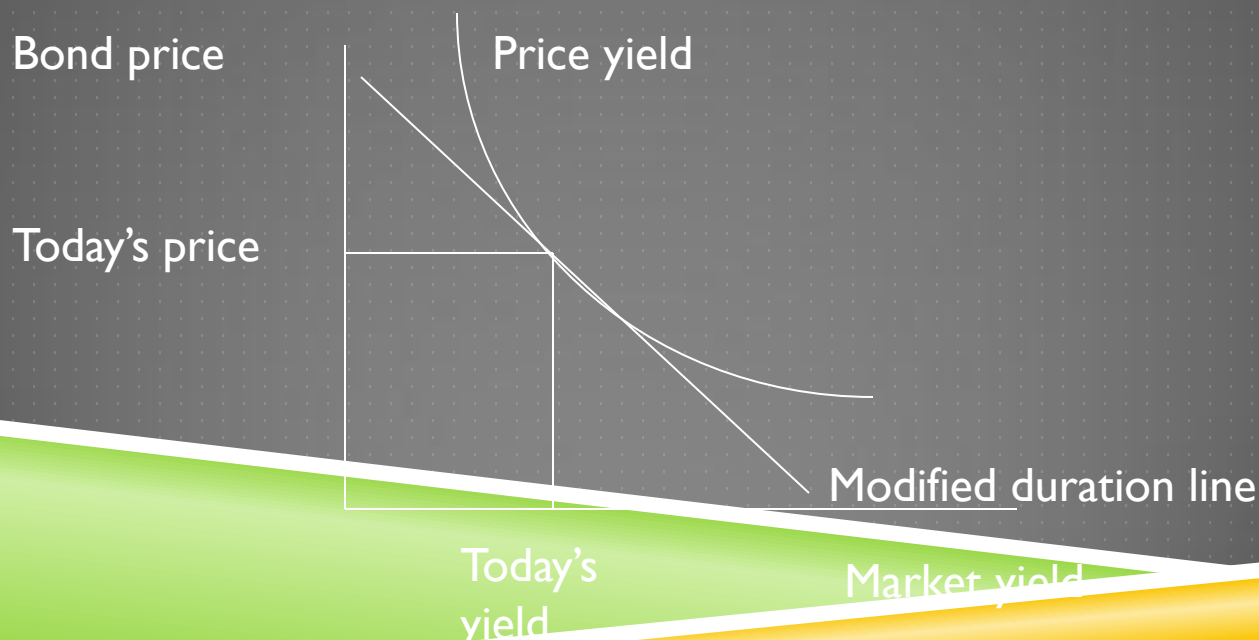
- ▶ The expression

$$\frac{D}{1 + y/m}$$

is referred to as the “modified duration”

CONVEXITY

- ▶ We saw with duration that we could estimate the sensitivity of a bond's price change to change in the market yield. The accuracy however depends on the size of the yield change.
- ▶ Duration is the first derivative of the price-yield function. Convexity is the second derivative of the price-yield function. Convexity is the rate of change in modified duration as yields shift.



CONVEXITY

The convexity of a bond is defined as

$$C = \frac{1}{B} \frac{\partial^2 B}{\partial y^2} = \frac{\sum_{i=1}^n c_i t_i^2 e^{-yt_i}}{B}$$

so that

$$\frac{\delta B}{B} = -D\delta y + \frac{1}{2} C(\delta y)^2$$

DURATION MATCHING

- ▶ This involves hedging against interest rate risk by matching the durations of assets and liabilities
- ▶ It provides protection against small parallel shifts in the zero curve

USE OF EURODOLLAR FUTURES

- ▶ One contract locks in an interest rate on \$1 million for a future 3-month period
- ▶ How many contracts are necessary to lock in an interest rate on \$1 million for a future six-month period?

DURATION-BASED HEDGE RATIO

$$\frac{PD_P}{F_C D_F}$$

- F_C Contract price for interest rate futures
- D_F Duration of asset underlying futures at maturity
- P Value of portfolio being hedged
- D_P Duration of portfolio at hedge maturity

EXAMPLE

- ▶ It is August. A fund manager has \$10 million invested in a portfolio of government bonds with a duration of 6.80 years and wants to hedge against interest rate moves between August and December
- ▶ The manager decides to use December T-bond futures. The futures price is 93-02 or 93.0625 and the duration of the cheapest to deliver bond is 9.2 years
- ▶ The number of contracts that should be shorted is

$$\frac{10,000,000}{93,062.50} \times \frac{6.80}{9.20} = 79$$

LIMITATIONS OF DURATION-BASED HEDGING

- ▶ Assumes that only parallel shift in yield curve take place
- ▶ Assumes that yield curve changes are small
- ▶ When T-Bond futures is used assumes there will be no change in the cheapest-to-deliver bond

GAP MANAGEMENT (BUSINESS SNAPSHOT 6.3)

This is a more sophisticated approach used by banks to hedge interest rate. It involves

- ▶ Bucketing the zero curve
- ▶ Hedging exposure to situation where rates corresponding to one bucket change and all other rates stay the same