Rich-Cheap and Relative Value Trading

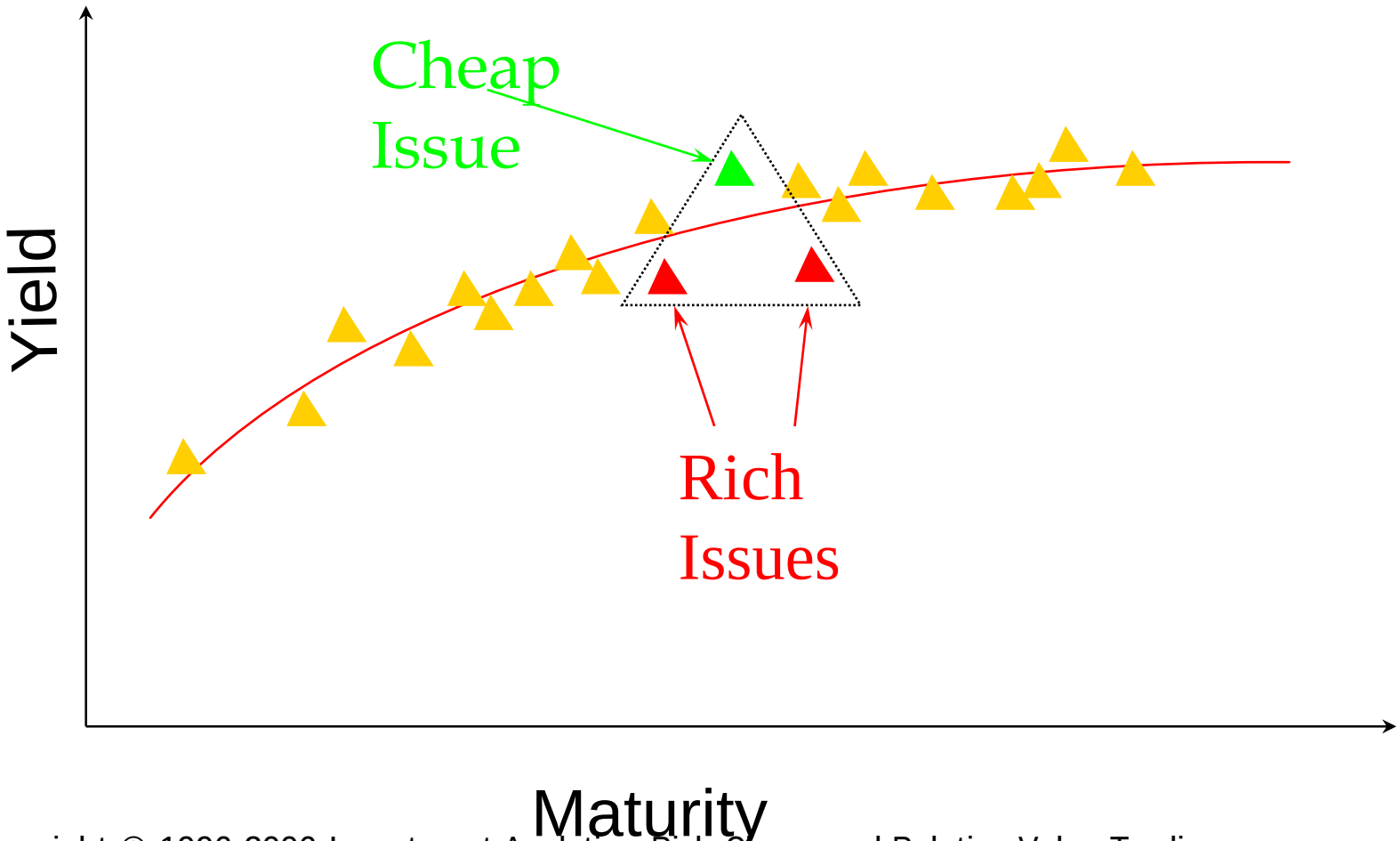
Rich/Cheap Analysis & Relative Value Trading

- Principles of rich/cheap analysis
- Relative value concepts
- Total return analysis

Rich-Cheap Analysis

- Select the appropriate tax-rate
- Identify the tax-efficient bonds
- Estimate the spot tax-yield curve using the efficient bonds
- Identify the issues which are low yield (‘rich’) or high yield (‘cheap’) relative to the curve
- Initiate duration-weighted trade

Rich-Cheap Graphical Analysis



Problems with Simple Approach

- Coupon
  - Issues with different coupons trade at different yields
- Risk-Return
  - Maturity is an inexact measure of risk
  - Yield is an inexact measure of return
- Liquidity
  - On-the-run vs off-the-run
  - Issues on repo special

Example: Rich/Cheap Analysis Lab

- Simple Example: Worksheet-Rich Cheap Analysis
  - Work out spot rates
  - Two 2-year notes:
    - 71/2% trading at par, 15% trading at 113.69
  - Market Yield
    - Calculate YTM on both bonds, given market prices
  - Theoretical Price/Yield
    - Calculate theoretical price & yield on each note
- Conclusion:
  - What is the relationship between coupon and yield?

Solution: Rich/Cheap Analysis Lab

- 7.5% 2-year Note:

Market		Theoretical	
Price	Yield	Price	Yield
100	7.5%	100.09	7.45%

- 15% 2-year Note:

Market		Theoretical	
Price	Yield	Price	Yield
113.69	7.5%	113.87	7.41%

- Both issues are cheap, high coupon > low coupon

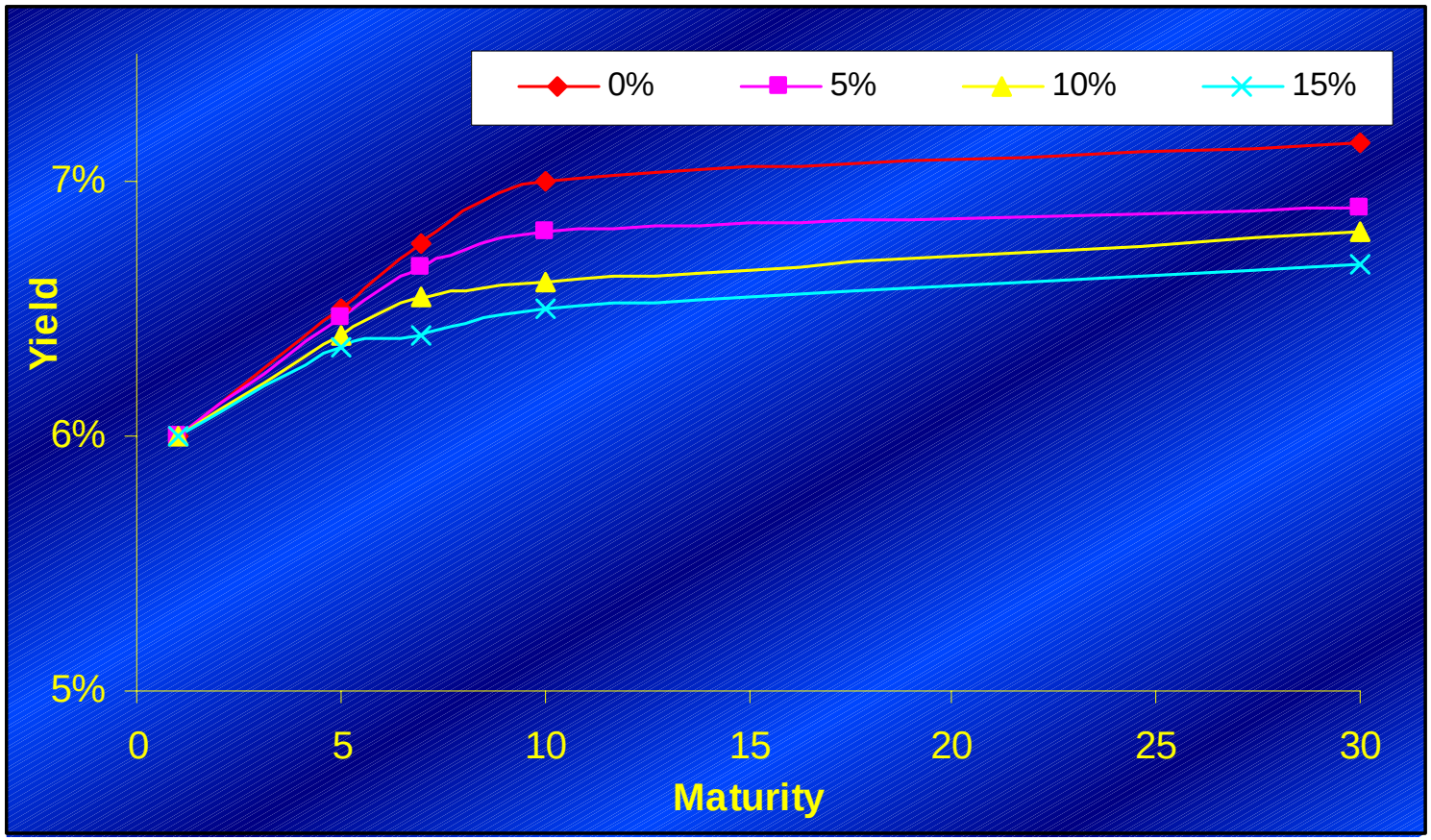
Impact of Coupon on Bond Value

- YTM calculation
  - Makes simplifying assumption of constant reinvestment rate
- With rising spot rates:
  - Low coupon bonds must trade at higher yields than high coupon bonds to compensate

Iso-Coupon Curves

- Implication
  - To judge richness or cheapness of an issue must take account of coupon
    - Coupon adjusted yield
- Iso-Coupon Yield Curves
  - Group bonds by coupon
  - Plot YTM vs Maturity (duration)
  - Assess value vs appropriate curve

Iso-Coupon Curves - Example



Bond Stripping & Repackaging

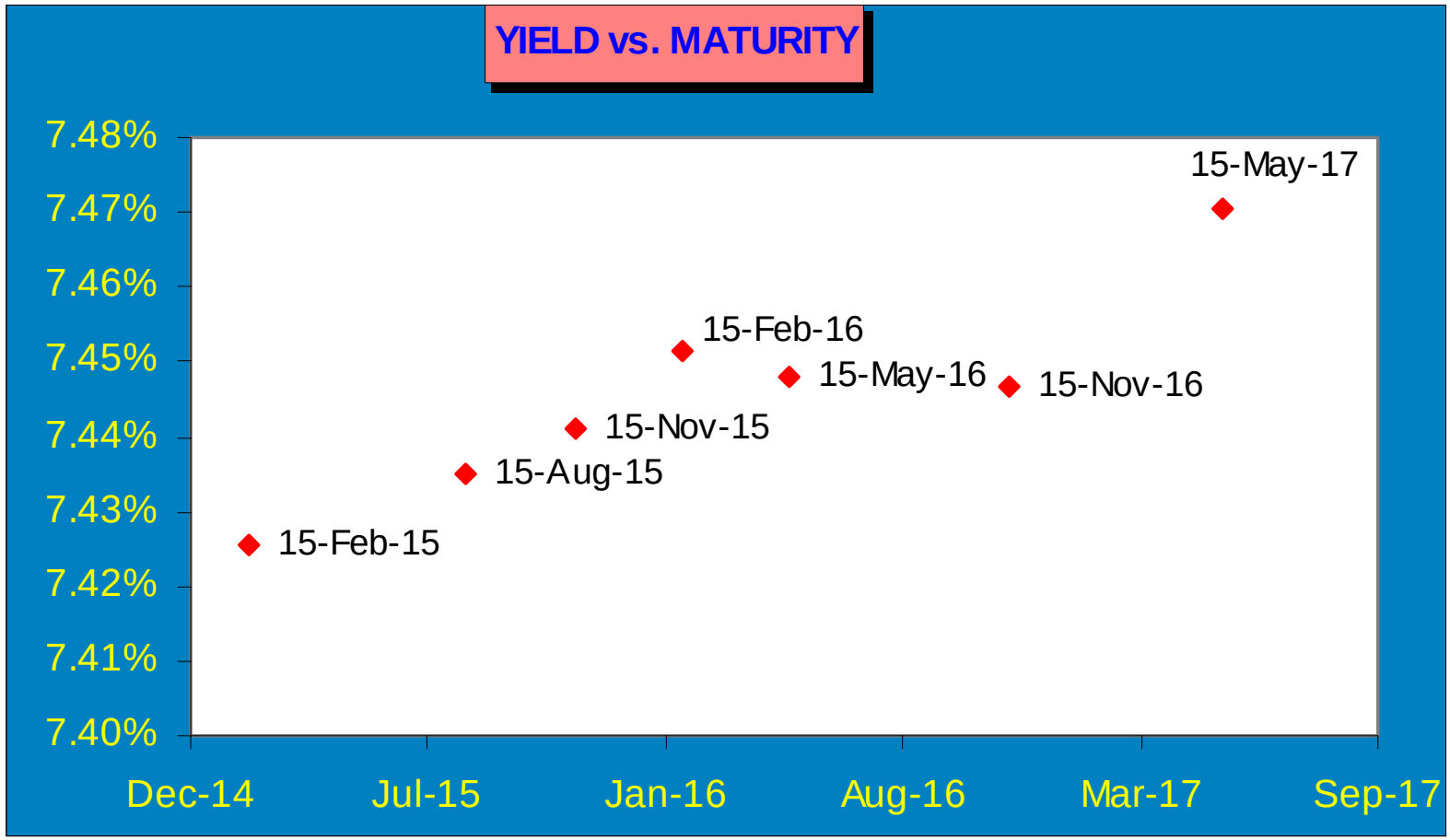
- Trading based on a variant of rich-cheap analysis
- Replicate the cash flows of inefficient bonds using the efficient bonds
- Stripping:
  - Buy cheap bond & sell off the cash flows (as ZCB's)
- Repackaging:
  - Sell rich bond & hedge with replicating cash flows from efficient bonds

Relative Value Concepts

- Yield curve as a measure of risk-return tradeoff
  - Maturity as a proxy for risk
  - Look at yield pickup on extension to identify value
- Example

Settlement	2-May-95						
Maturity	Coupon	Clean Price	Acrrued Interest	Dirty Price	YTM	Yield Pickup (bp)	Modified Duration
15-Feb-15	11 1/4	139 10/32	2.3619	141.6744	7.4255%		9.3628
15-Aug-15	10 5/8	133 4/32	2.2307	135.3557	7.4351%	0.96	9.5637
15-Nov-15	9 7/8	125 13/32	4.5829	129.9891	7.4412%	0.61	9.5491
15-Feb-16	9 1/4	118 27/32	1.9420	120.7857	7.4514%	1.02	9.9062
15-May-16	7 1/4	97 29/32	3.3646	101.2709	7.4482%	-0.32	10.2487
15-Nov-16	7 1/2	100 18/32	3.4807	104.0432	7.4467%	-0.14	10.2782
15-May-17	8 3/4	113 23/32	4.0608	117.7795	7.4706%	2.38	10.0543

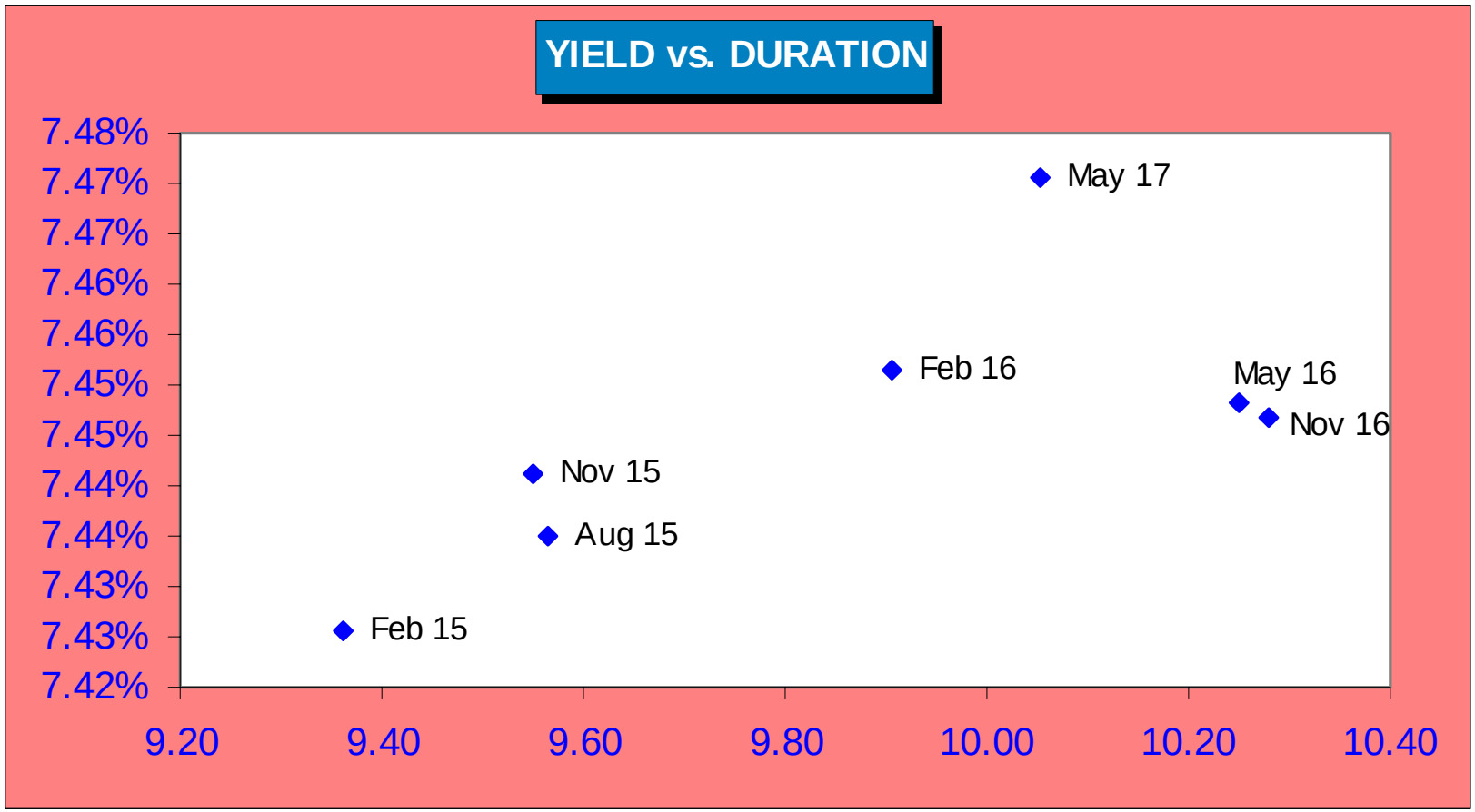
Yield vs. Maturity



Yield Curve Analysis

- Fairly normal yield curve
  - Yield on the 9 1/4 of Feb ‘16 looks to be a basis point too high
  - 2.4bp pickup on the 8 /4% of May ‘17 indicates value in this sector
- Clear relationship between yield and tenor
- What about relationship between yield and risk?
  - Use duration as a proxy for risk
  - Plot yield vs. duration
  - Makes relative values more distinct

Yield vs. Duration



Yield Enhancement Swap

- Because it has higher coupon, the 8 3/4 of May ‘17 has lower duration than the 7 1/4 of May ‘16 or the 7 1/2 or Nov ‘16.
- By trading at slightly higher yield, the market would appear to be underpricing it slightly
- Bond Swap:

Action	Maturity	Coupon	Price	YTM	Duration	
Sell	15-Nov-16	7 1/2%	100 18/32	7.4467%	10.278	
Buy	15-May-17	8 3/4%	11323/32	7.4706%	10.054	

Limitations to Traditional Yield Curve Analysis

- Yield curve:
  - A primitive expression of risk/return tradeoff
- Drawbacks
  - Maturity is poor indicator of bond price volatility
  - YTM is not a measure of potential return
    - For Buy and Hold investor, assumes coupons are reinvested at YTM
    - For Active investor, assumes that if bond is sold prior to maturity, it is sold at same yield as on purchase date

Total Return

- Holding Period Return (HPR)
  - Measures bond's total return over given period
  - HPR is a *time-weighted* average return

- $$\text{HPR} = \frac{\text{ending market value} + \text{income receipts}}{\text{beginning market value}} - 1$$

HPR Example

- 7%, 30Yr T-Bond, priced at par to yield 7%
- 1-year HPR:

[($1000 + $35 + $35 + $1.23*) / $1000] -1 =

HPR = 7.12%

* $35 x 0.07 x 0.5 = $1.23

HPR Example

- 7%, 30yr T-Bond, priced at par to yield 7%
- 1 Year HPR:

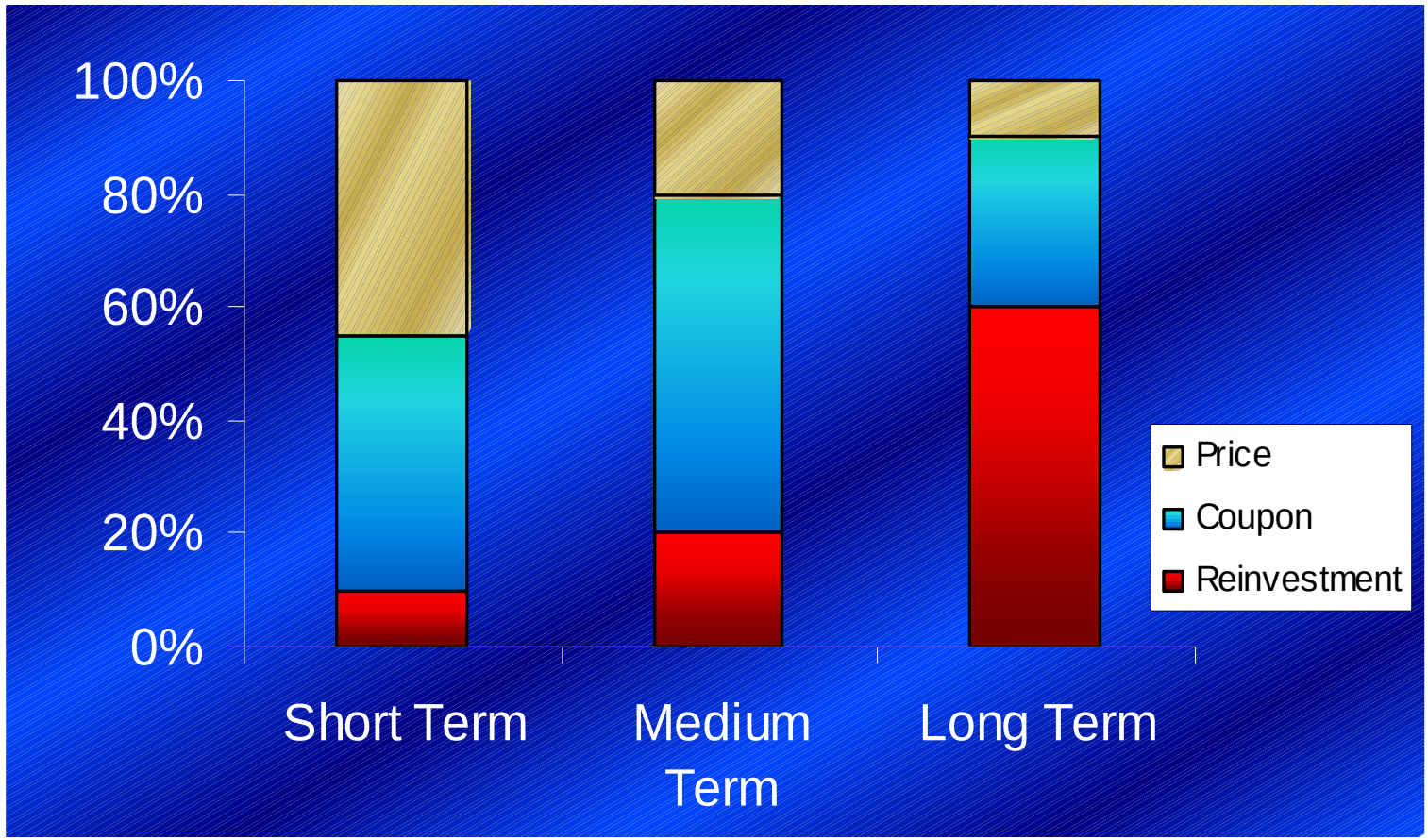
	Falling Rates 6%	Constant Rates 7%	Rising Rates 8%
HPR	20.78%	7.12%	-4.08%

Components of Total Return

- Price return
  - (ending bond price - beginning bond price)
    - Excluding accrued interest
- Coupon return
  - Coupon receipts +/- accrued interest
- Reinvestment return
  - Interest earned on reinvested coupons

Total Return = Price Return + Coupon Return

Components of Total Return

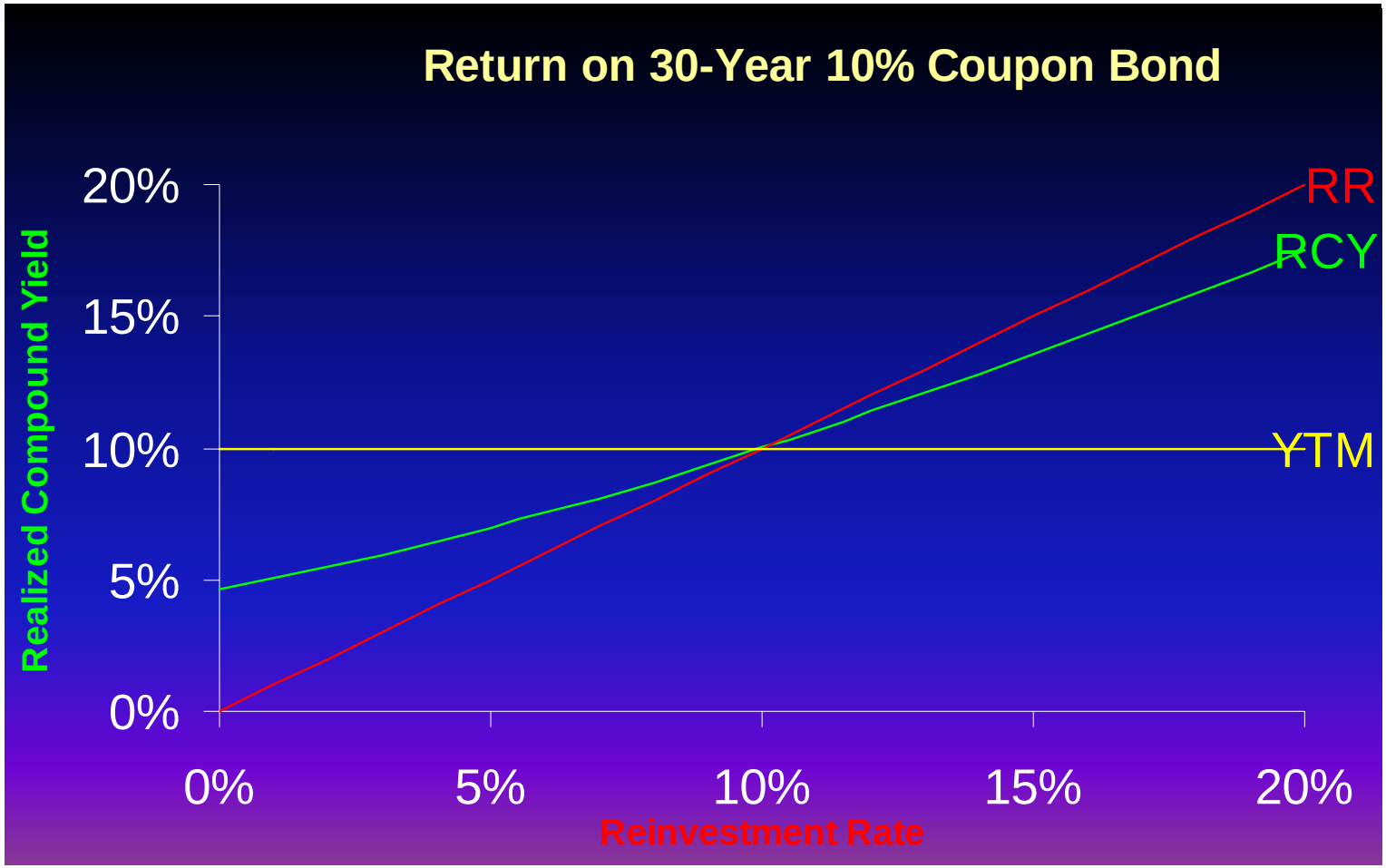


Realized Compound Yield

$$\Pr ice = \frac{FV}{\left(1+\frac{RCY}{2}\right)^{T}}$$

- RCY is a *dollar-weighted* average return
  - FV is the future value of the bond investment over the holding period

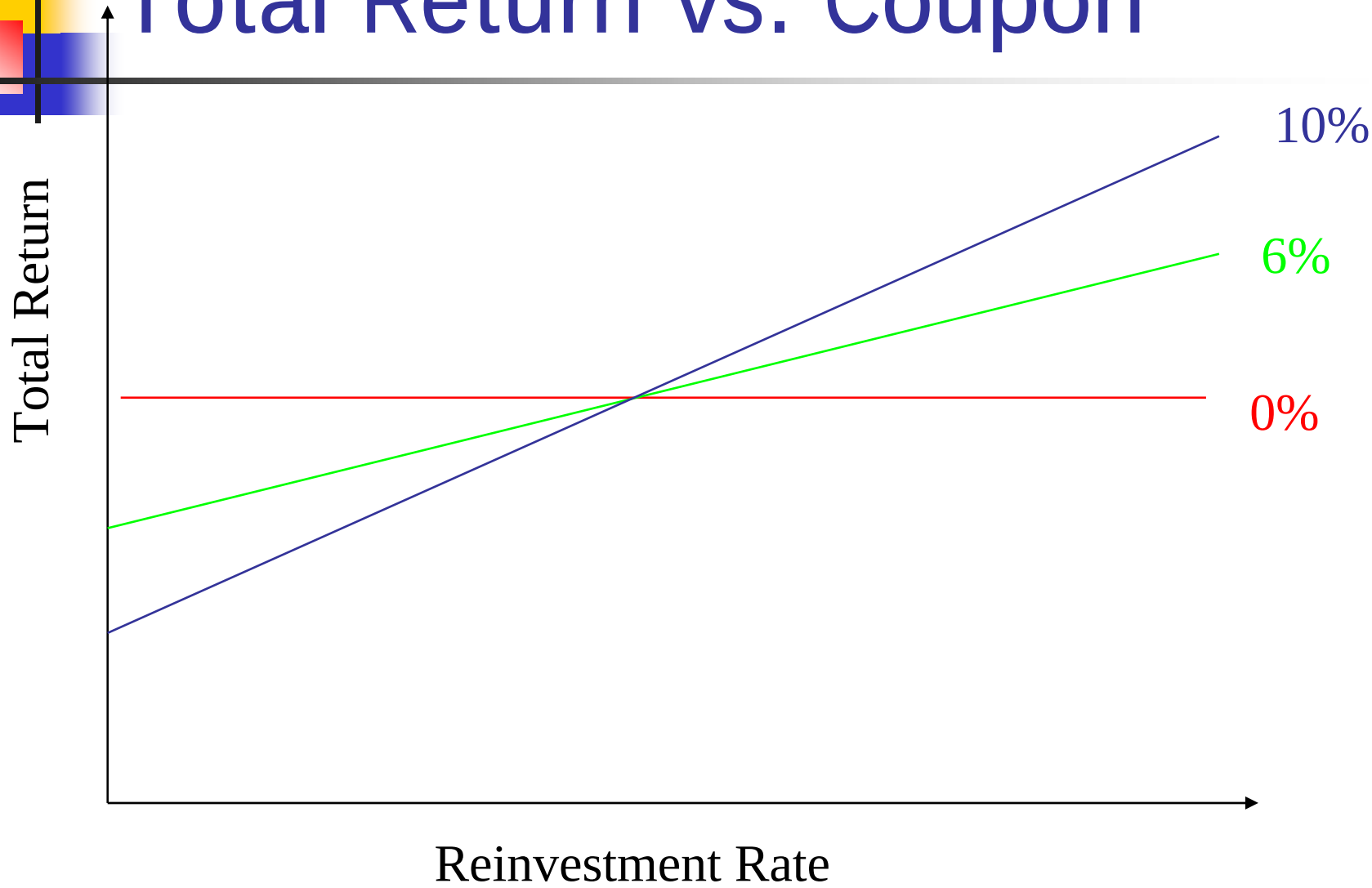
Reinvestment Rate and Realized Compound Yield



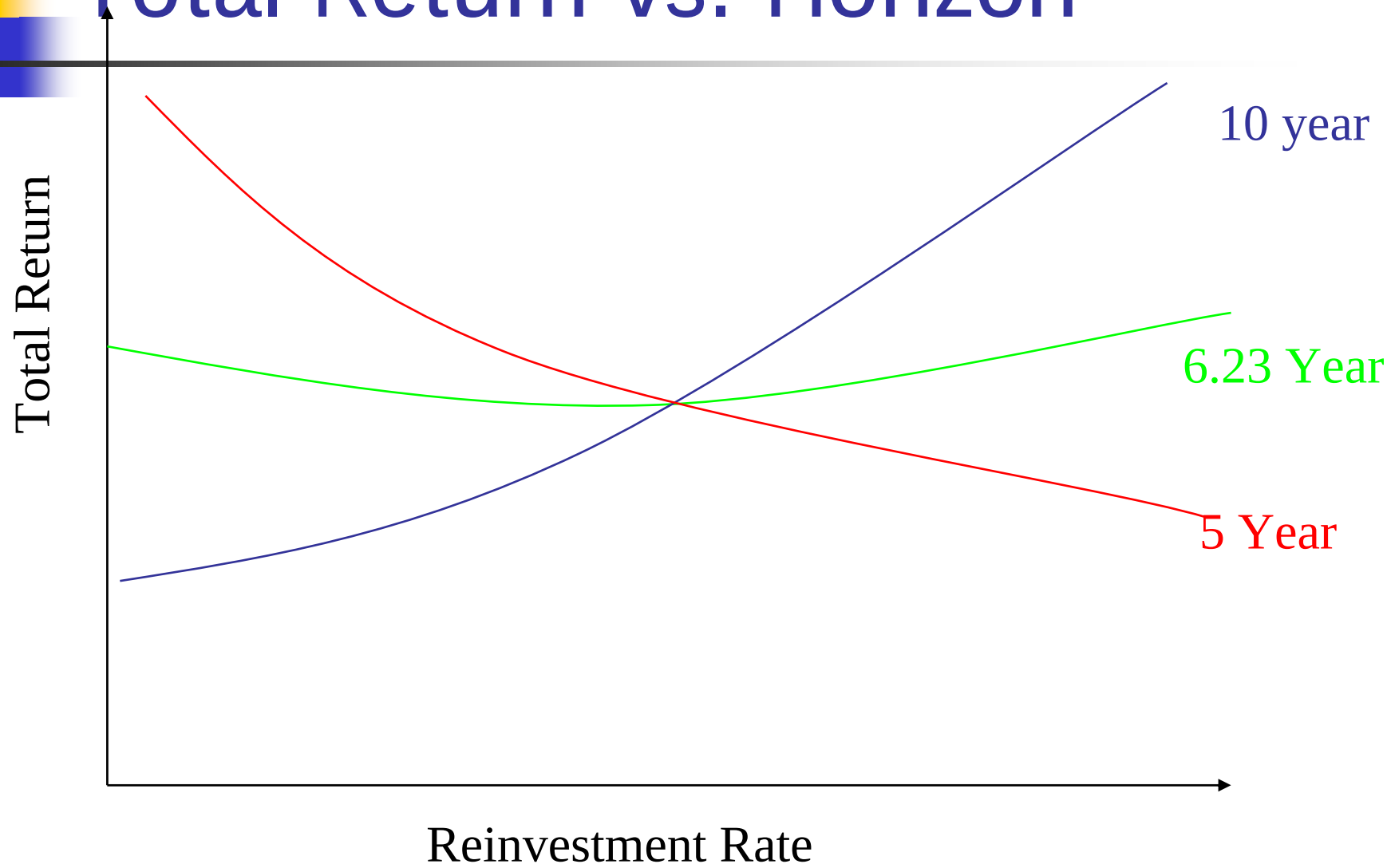
Characteristics of Total Return

- Effect of reinvestment rate on total return
  - Low vs. high coupon bonds
  - Short vs. long maturity issues
  - Holding period < maturity
- Lab: Total Return Analysis

Total Return vs. Coupon



Total Return vs. Horizon



Characteristics of Total Return - Summary

- Coupon
  - RR has greater effect for higher coupon issues
    - No effect for ZCB's
- Holding period
  - For long holding periods
    - Total return rises with RR
    - Reinvestment of coupon cash flows dominates return
  - For short holding periods
    - Total return falls with RR
    - Bond price at horizon dominates return
      - Greater RR implies lower price, hence return falls

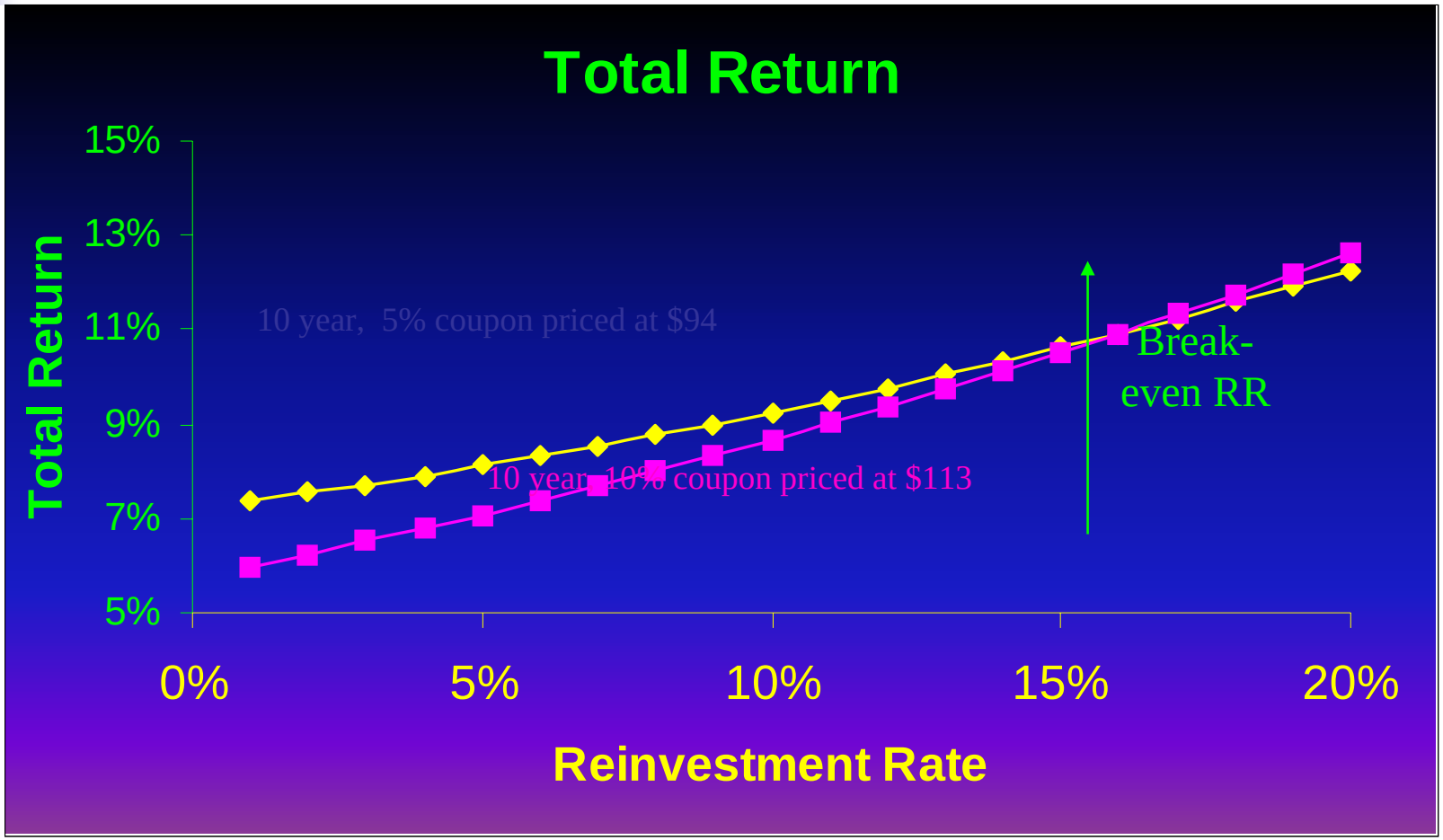
Immunized Portfolios and Total Return

- Portfolio with Horizon = Duration
- Coupon reinvestment effect balances price-discount effect
- Total return is approximately the same regardless of reinvestment rate
- Central concept of portfolio management

Breakeven Reinvestment Rate

- RR at which TR on two bonds is the same over given horizon
  - Used to decide which of two bonds is more attractive
  - For some bonds, may not be a breakeven RR
    - One bond totally dominates the other
      - Total return is always greater

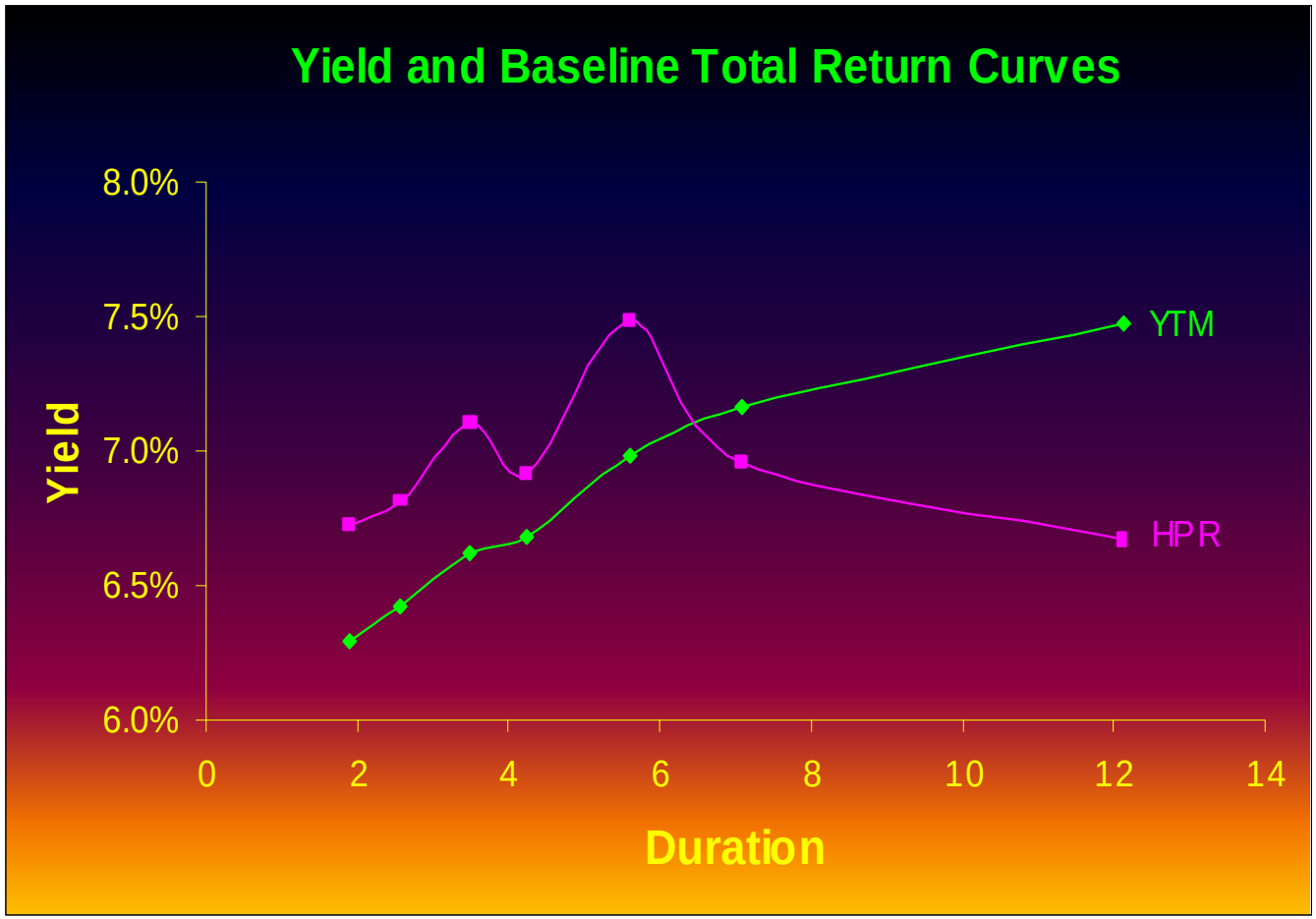
Breakeven RR - Example



The Total Return Curve

- Project returns for a given holding period
- Plot HPR against duration
  - Return vs. Risk
- Assumptions
  - Interest rates
  - Sector spreads (quality, maturity, coupon, issuer)
  - Reinvestment rate
- Baseline Total Return Curve
  - 1 Year horizon, yield curve shape unchanged
  - All reinvestments made in the middle of the curve

Total Return Curve Example



YTM vs. HPR Pickup

- Difference due to *yield curve roll factor*
  - As bond ages, it rolls down to new, lower yield
  - Also, moves from on-the-run to off-the-run
- Long duration bonds are especially sensitive to roll factors:
- % change in price: $(\Delta P/P) = -D^* \times \Delta Y$
  - D^* is modified duration

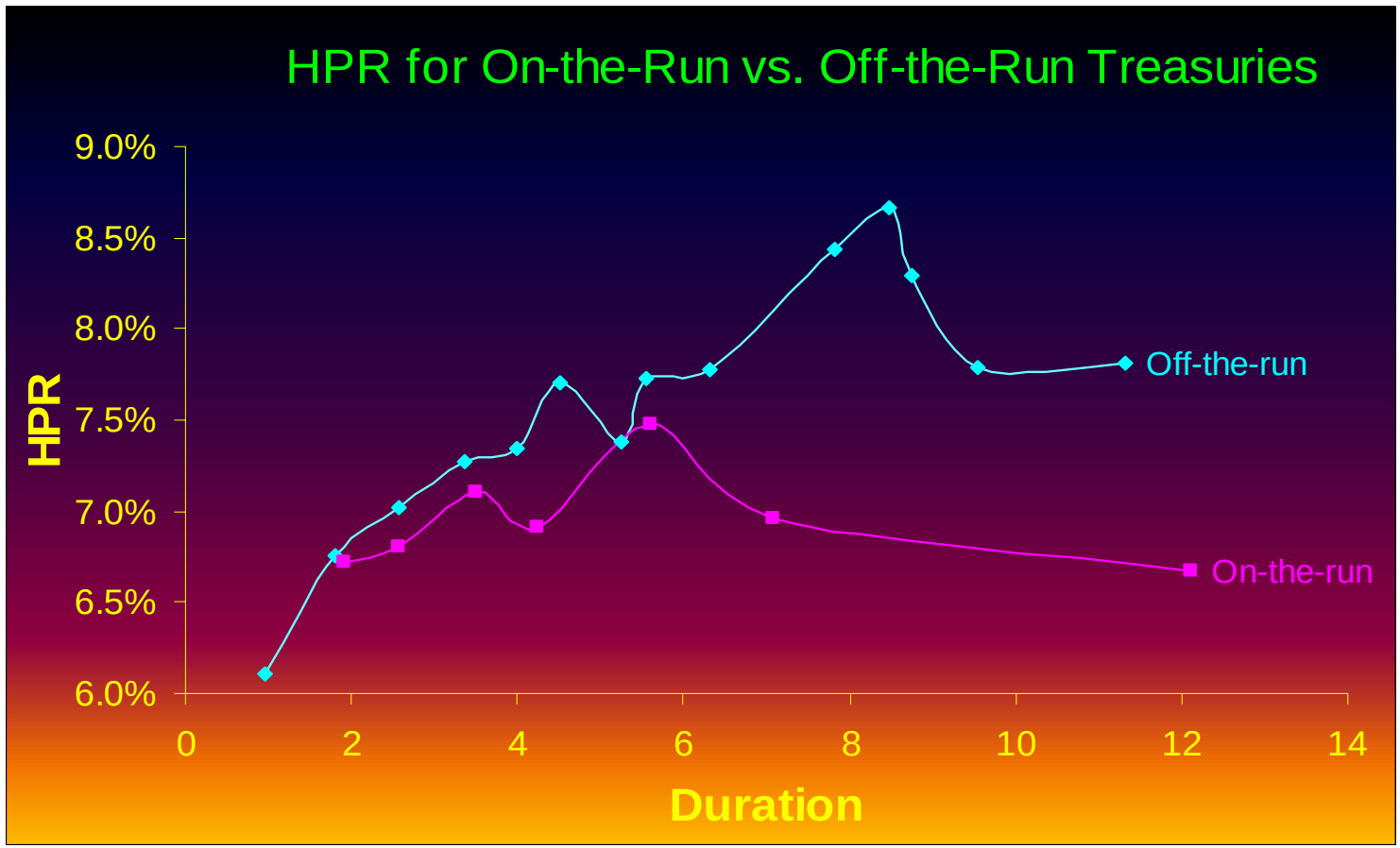
Yield and Total Return Pickup

Maturity	Duration	YTM	YTM Pickup on Extension	1-Year HPR	Total Return Pickup on Extension
2	1.91	6.29%		6.72%	
3	2.56	6.42%	13	6.81%	9
4	3.49	6.62%	20	7.10%	29
5	4.23	6.68%	6	6.91%	-19
7	5.6	6.98%	30	7.48%	57
10	7.07	7.16%	18	6.96%	-52
30	12.12	7.47%	31	6.67%	-29

30-year sector preferred on YTM basis

7-year sector preferred on HPR basis

On-the-Run vs. Off-the-Run HPR's



Relative Value & Risk-Return Tradeoff

- Market does not seem to appraise risk in a consistent fashion
- Attractive issues:
  - Off the run issues with 4-5 years and 8-9 years in duration
    - 6-yr, 8-yr, 15-yr maturities
- Overvalued sectors:
  - All the current coupon issues
  - 5-yr, 7-yr and 29-yr off-the-runs

Factors Affecting Relative Value Trading in Practice

- Coupon
  - Low coupon issues trade at higher yields to give fair value (with an upward sloping yield curve)
- Tax effects
- Liquidity
  - On-the-run vs. off-the run treasuries
  - Issues on “special” in repo market
- Call provisions (& other option features)
- Transaction costs, shorting restrictions