Interest Rates: Term Structure

Michael R. Roberts
William H. Lawrence Professor of Finance
The Wharton School, University of Pennsylvania

Last Time

Interest Rates

- Interest rate quotes
- Non-annual cash flows and compounding

This Time

Interest Rates

- Term Structure
- Yield Curve

Term Structure

Thus far we have assumed discount rates are constant through time

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$$PV = \frac{CF_1}{(1+R)} + \frac{CF_2}{(1+R)^2} + \frac{CF_3}{(1+R)^3} + \ldots$$

Same R …

Home Mortgage Refinancing Rates

REFINANCE RATES AVERAGES

Product	Rate	Change	Last week
30 year fixed refi	4.12%	-- 0.00	4.12%
15 year fixed refi	3.19%	▲ 0.03	3.16%
10 year fixed refi	3.23%	▲ 0.01	3.22%

Fixed Term CD Rates

Fixed Term CD - Time Deposits & IRA/CESA CDs†

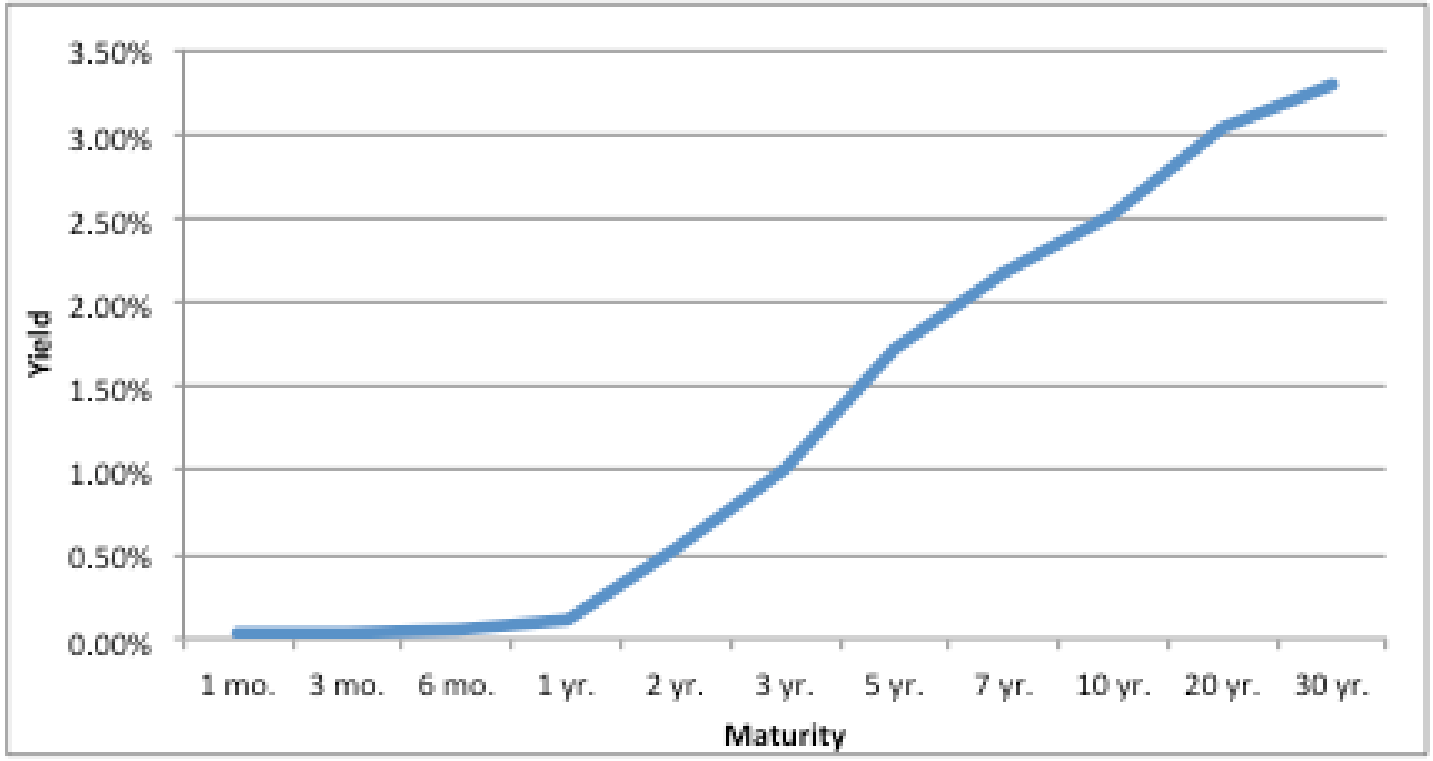
	Less than $10,000		$10,000-$99,999		$100,000 and over	
	Rate %	APY %†	Rate %	APY %†	Rate %	APY %†
28 - 179 Days*	0.03	0.03	0.03	0.03	0.03	0.03
06 - 11 Months	0.03	0.03	0.03	0.03	0.03	0.03
12 - 17 Months	0.05	0.05	0.05	0.05	0.05	0.05
18 - 23 Months	0.07	0.07	0.07	0.07	0.07	0.07
24 - 35 Months	0.10	0.10	0.10	0.10	0.10	0.10
36 - 47 Months	0.12	0.12	0.12	0.12	0.12	0.12
48 - 59 Months	0.15	0.15	0.15	0.15	0.15	0.15
60 - 119 Months	0.15	0.15	0.15	0.15	0.15	0.15
120 Months	0.15	0.15	0.15	0.15	0.15	0.15

CD - Time Deposit Minimum to open: $1,000
IRA/CESA CDs Minimum to open: $1,000 IRAs / $500 CESAs
*IRA/CESA CDs are not available for a term less than 6 Months

The Term Structure is the relation between the investment term and the interest rate

The Yield Curve is a graph of the relation between the investment term and the interest rate

Treasury Yield Curve – 7/24/2014



What is a yield?

A yield, *y*, is the one discount rate that when applied to the promised cash flows of the security recover the price of the security.

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$$\text{Price} = \frac{CF_1}{(1+y)} + \frac{CF_2}{(1+y)^2} + \frac{CF_3}{(1+y)^3} + \ldots + \frac{CF_T}{(1+y)^T}$$

To build the yield curve simply compute the yield for securities of different maturities..

$$P_1 = \frac{CF_1}{(1+y_1)}$$

$$P_2 = \frac{CF_1}{(1+y_2)} + \frac{CF_2}{(1+y_2)^2}$$

$$\vdots$$

$$P_T = \frac{CF_1}{(1+y_T)} + \frac{CF_2}{(1+y_T)^2} + \frac{CF_3}{(1+y_T)^3} + \ldots + \frac{CF_T}{(1+y_T)^T}$$

Same as computing the discount rate for securities with different maturities

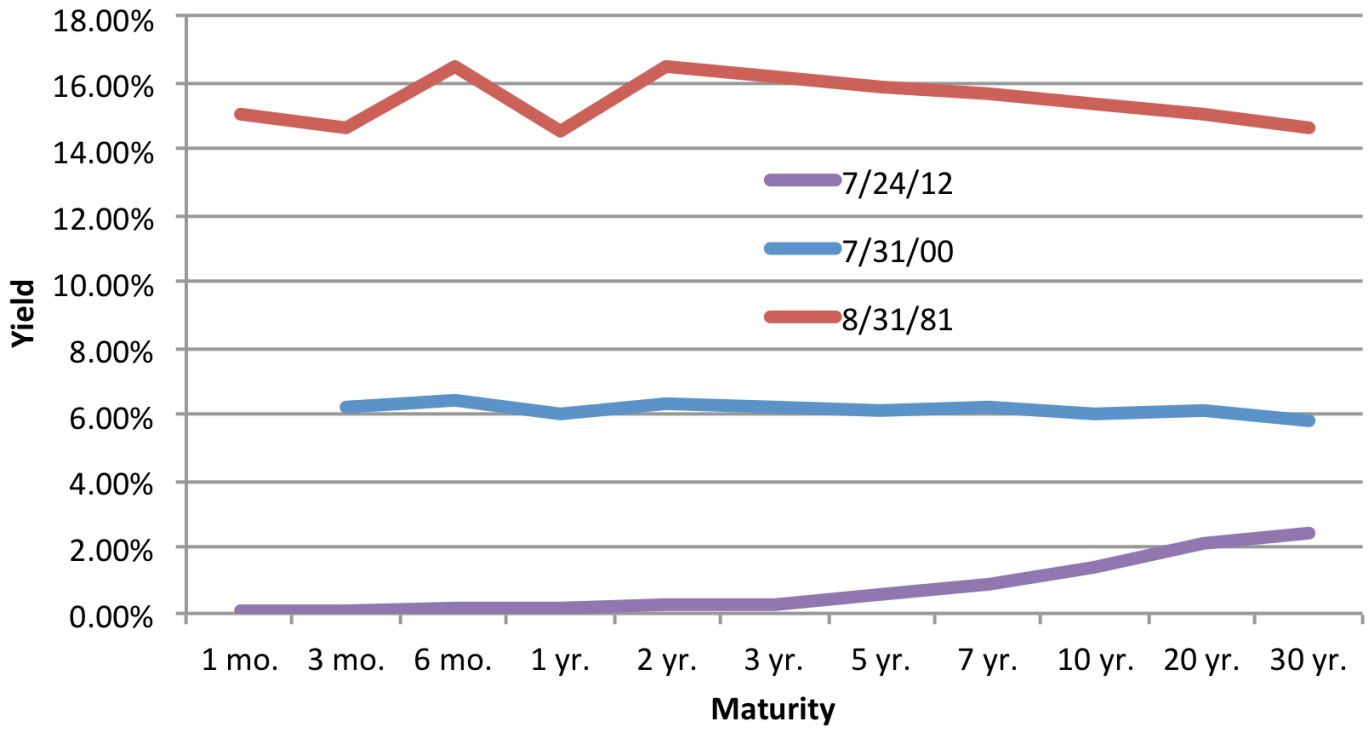
$$P_1 = \frac{CF_1}{(1+R_1)}$$

$$P_2 = \frac{CF_1}{(1+R_2)} + \frac{CF_2}{(1+R_2)^2}$$

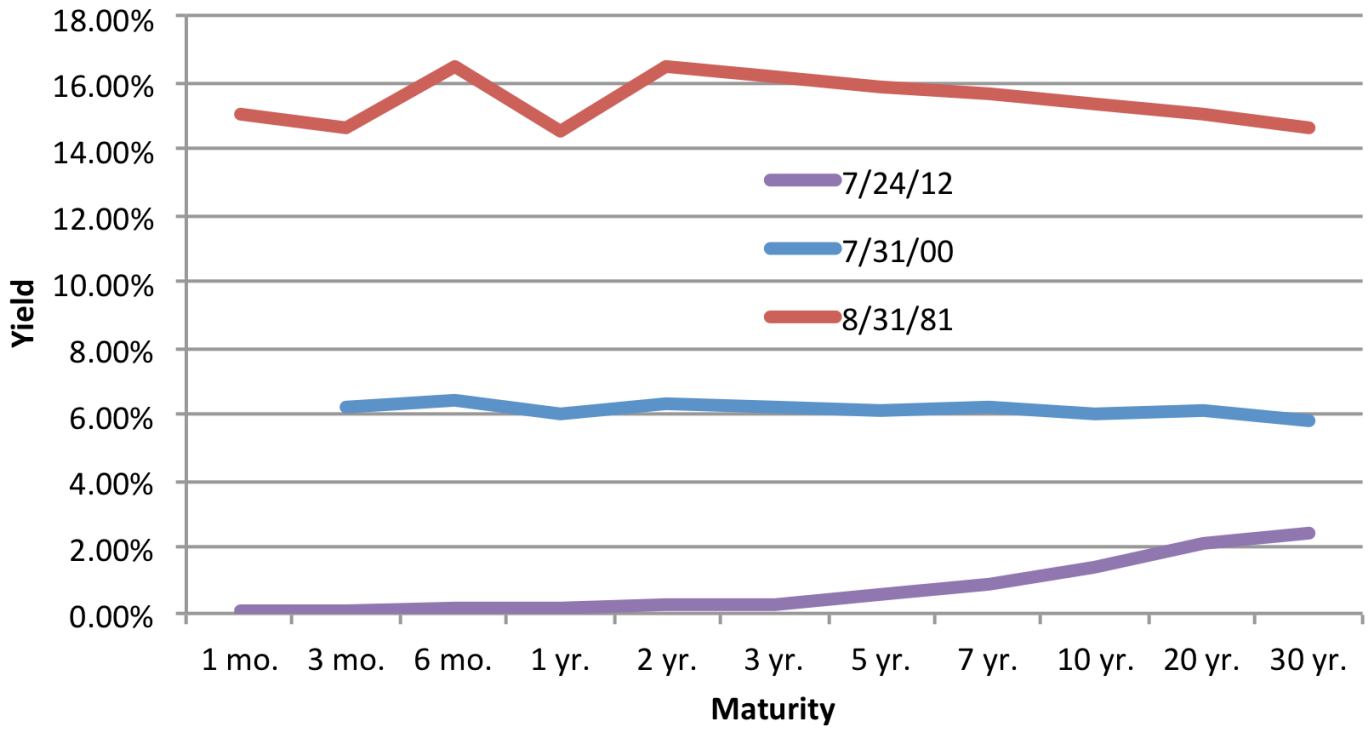
$$\vdots$$

$$P_T = \frac{CF_1}{(1+R_T)} + \frac{CF_2}{(1+R_T)^2} + \frac{CF_3}{(1+R_T)^3} + \ldots + \frac{CF_T}{(1+R_T)^T}$$

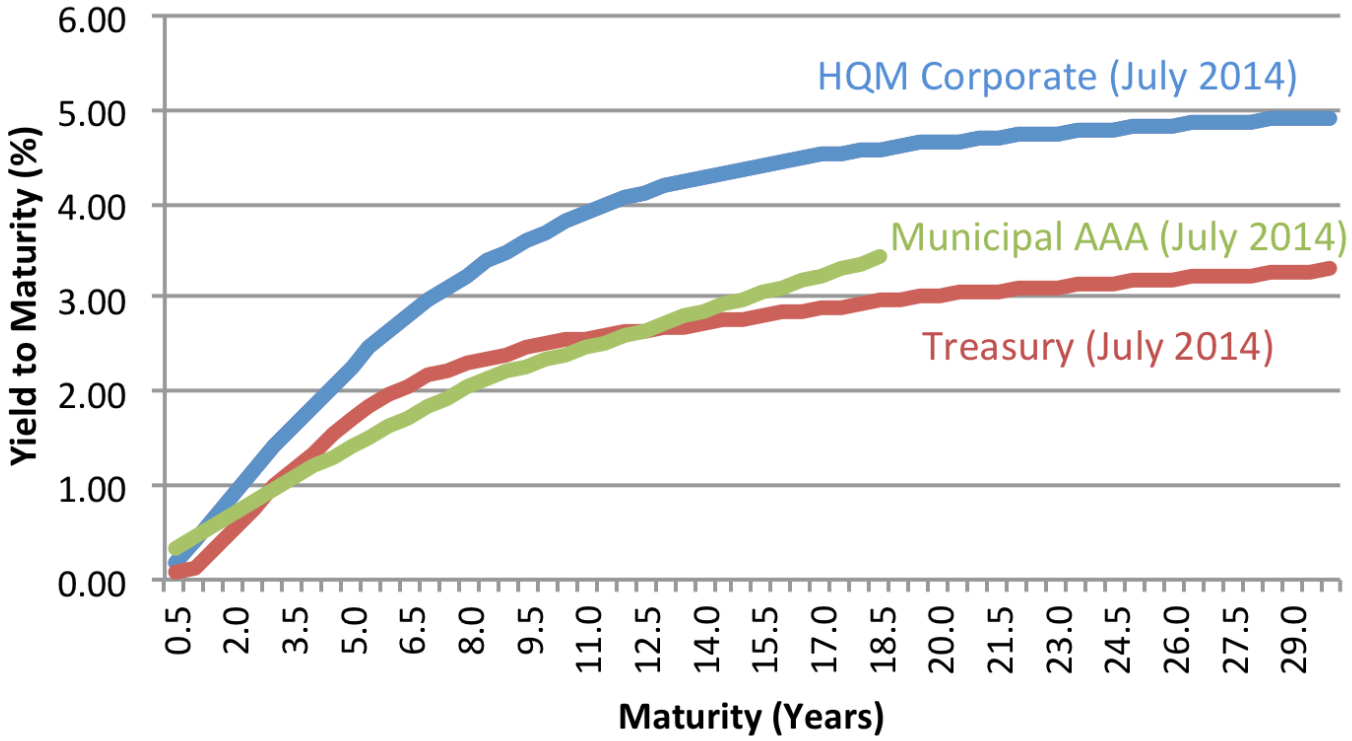
Yield Curves can move around a lot



Treasury Yield Curves graph the relation between interest rates on risk-free loans and loan maturity



Other yield curves graph the relation between interest rates on risky loans and loan maturity



Lesson: Yields vary by maturity and risk

ALL CORPORATES: YIELD BY CREDIT RATING AND MATURITY
(Median Yield For Previous Trading Day)

	1-2 Year	2-5 Year	5-10 Year	10 Year+
AAA	0.58	1.46	2.45	3.38
AA	0.47	1.54	2.70	3.89
A	0.84	1.82	3.01	3.97
BBB	1.23	2.33	3.82	5.51

All of these interest rates are referred to as spot rates

The spot rate is the interest rate for a loan made today

- Typically a different spot rate for loans of different maturities and risk

Punch line:

This is an approximation:

$$PV = \frac{CF_1}{(1+R)} + \frac{CF_2}{(1+R)^2} + \frac{CF_3}{(1+R)^3} + \ldots$$

for

$$PV = \frac{CF_1}{(1+R_1)} + \frac{CF_2}{(1+R_2)^2} + \frac{CF_3}{(1+R_3)^3} + \ldots$$

Summary

Lesson

- The term structure refers to the relation between interest rates and investment term
  - Loans (savings) of different maturities (terms) typically have different interest rates

Lesson

- The yield curve graphs the relation between interest rates and investment term

- Interest rates vary by the risk of the investment

Lessons

- The spot rate is the interest rate for a loan made today

- The spot rate comes from the yield curve and there is typically a different spot rate for loans of different maturities (and risk)

Coming up next

- Discounted Cash Flow (DCF)
  - Time value of money in a corporate setting
  - Figure out how to derive (free) cash flows
  - Capital budgeting is illustrative vehicle