

Lecture 10: Debt Markets and Term Structure

Economics 252, Spring 2008

Prof. Robert Shiller, Yale University

Open Yale courses

Copyright © 2008 Yale University. Some rights reserved. Unless otherwise indicated on this document or on the Open Yale Courses website, all content is licensed under a Creative Commons License (Attribution-NonCommercial-ShareAlike 3.0).



Historical Securities Search Results

Treasury Bills

Auction Dates: From: Feb 8, 2008 To: Feb 15, 2008

Security Terms: All

Sorted By: Auction Date in Descending order

Security Term	Auction Date	Issue Date	Maturity Date	Discount Rate %	Investment Rate %	Price Per \$100	CUSIP
60-DAY	02-14-2008	02-15-2008	04-15-2008	2.510	2.563	99.581667	912795UD1
63-DAY	02-13-2008	02-14-2008	04-17-2008	2.440	2.491	99.573000	912795D81
4-WEEK	02-12-2008	02-14-2008	03-13-2008	2.500	2.547	99.805556	912795D32
26-WEEK	02-11-2008	02-14-2008	08-14-2008	2.080	2.137	98.948444	912795F97
13-WEEK	02-11-2008	02-14-2008	05-15-2008	2.250	2.301	99.431250	912795E49

Open Yale courses

Copyright © 2008 Yale University. Some rights reserved. Unless otherwise indicated on this document or on the Open Yale Courses website, all content is licensed under a Creative Commons License (Attribution-NonCommercial-ShareAlike 3.0).

Discount Bonds Pricing

Term T , Yield to Maturity (YTM) r

$$P_t = \frac{1}{(1+r)^T}$$

$$P_t = \frac{1}{(1+r/2)^{2T}}$$

Compound Interest

- If annual rate is r , compounding once per year, balance = $(1+r)^t$ after t years.
- If compounded twice per year, balance is $(1+r/2)^{2t}$ after t years.
- If compounded n times per year, balance is $(1+r/n)^{nt}$ after t years.
- Continuous compounding, balance is e^{rt} .

Price & Yield on T-Bills

- For buyer, $\text{Price} = 100 - \text{Discount}$
- $\text{Discount} = \text{Asked} * (\text{Days to Maturity} / 360)$. (Same as formula on page 295 of Fabozzi, where $D = \text{Discount}$, $F = 100$, $Y = \text{Asked} / 100$, $t = \text{Days}$)
- $\text{Yield} = (\text{Discount} / \text{Price}) (365 / (\text{Days to Maturity}))$. (Unless maturity > 6 months, in which case quadratic formula using semi-annual compounding is required.)

Conventional Bonds Carry Coupons

- Conventional Bond Issued at par (100), coupons every six months.
- Term is time to maturity.

$$P_t = c\left(\frac{1}{r} - \frac{1}{(1+r)^T} \frac{1}{r}\right) + \frac{100}{(1+r)^T}$$

$$P_t = \frac{c}{2}\left(\frac{1}{r/2} - \frac{1}{(1+r/2)^{2T}} \frac{1}{r/2}\right) + \frac{100}{(1+r/2)^{2T}}$$



Historical Securities Search Results

Treasury Notes

Auction Dates: From: *Jan 1, 2008* To: *Feb 15, 2008*

Security Terms: *All*

Sorted By: *Auction Date* in *Descending* order

Security Term	Auction Date	Issue Date	Maturity Date	Interest Rate %	Yield %	Price Per \$100	CUSIP
10-YEAR	02-06-2008	02-15-2008	02-15-2018	3.500	3.620	99.000685	912828HR4
5-YEAR	01-29-2008	01-31-2008	01-31-2013	2.875	2.909	99.842844	912828HQ6
2-YEAR	01-28-2008	01-31-2008	01-31-2010	2.125	2.237	99.782126	912828HP8
10-YEAR	01-10-2008	01-15-2008	01-15-2018	1.625	1.655	99.724557	912828HN3

Open Yale courses

Copyright © 2008 Yale University. Some rights reserved. Unless otherwise indicated on this document or on the Open Yale Courses website, all content is licensed under a Creative Commons License (Attribution-NonCommercial-ShareAlike 3.0).



Historical Securities Search Results

Treasury Bonds

Auction Dates: From: *Jan 1, 2008* To: *Feb 15, 2008*

Security Terms: *All*

Sorted By: *Auction Date* in *Descending* order

Security Term	Auction Date	Issue Date	Maturity Date	Interest Rate %	Yield %	Price Per \$100	CUSIP
30-YEAR	02-07-2008	02-15-2008	02-15-2038	4.375	4.449	98.780998	912810PW2
20-YEAR	01-24-2008	01-31-2008	01-15-2028	1.750	1.807	99.351033	912810PV4

Open Yale courses

Copyright © 2008 Yale University. Some rights reserved. Unless otherwise indicated on this document or on the Open Yale Courses website, all content is licensed under a Creative Commons License (Attribution-NonCommercial-ShareAlike 3.0).

Forward Rates

J. R. Hicks *Value and Capital* 1939

$$(1 + r_2)^2 = (1 + r_1)(1 + f_2)$$

$$(1 + r_k)^k = (1 + r_{k-1})^{k-1} (1 + f_k)$$

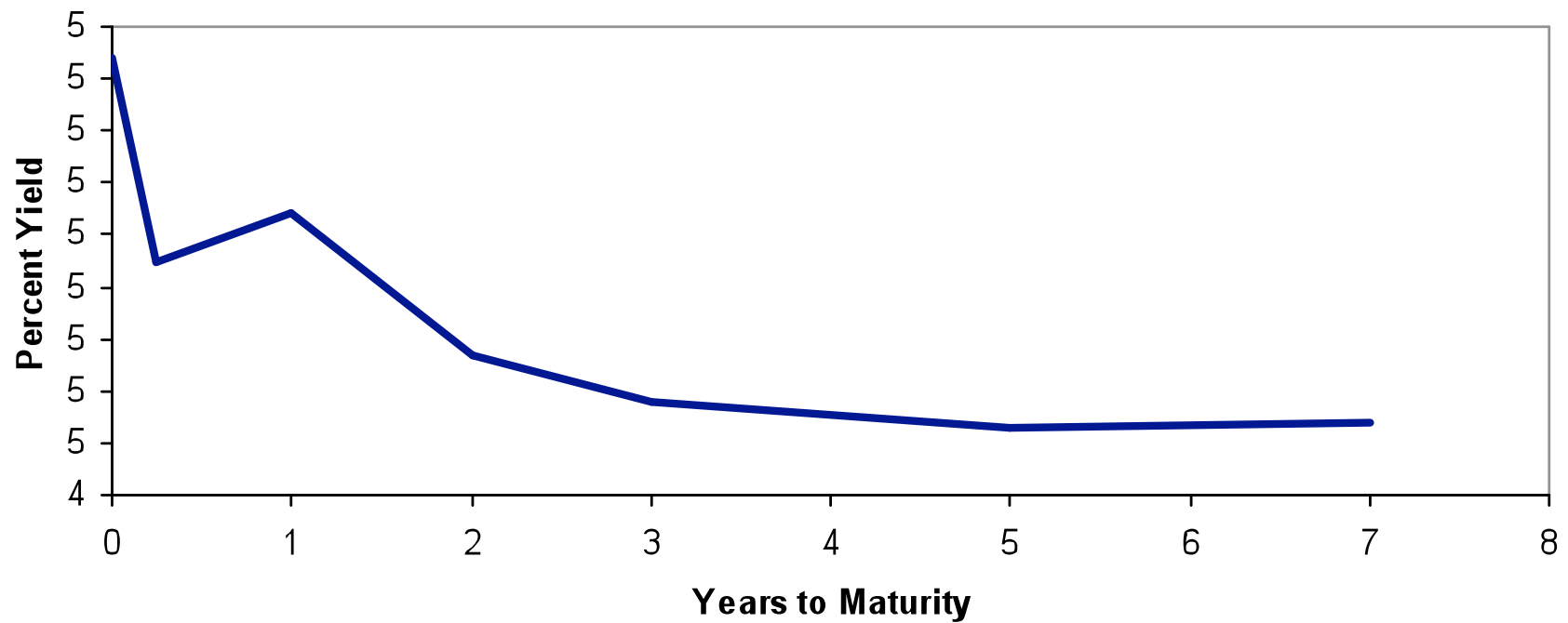
Jan 2008 Term Structure



Open Yale courses

Copyright © 2008 Yale University. Some rights reserved. Unless otherwise indicated on this document or on the Open Yale Courses website, all content is licensed under a Creative Commons License (Attribution-NonCommercial-ShareAlike 3.0).

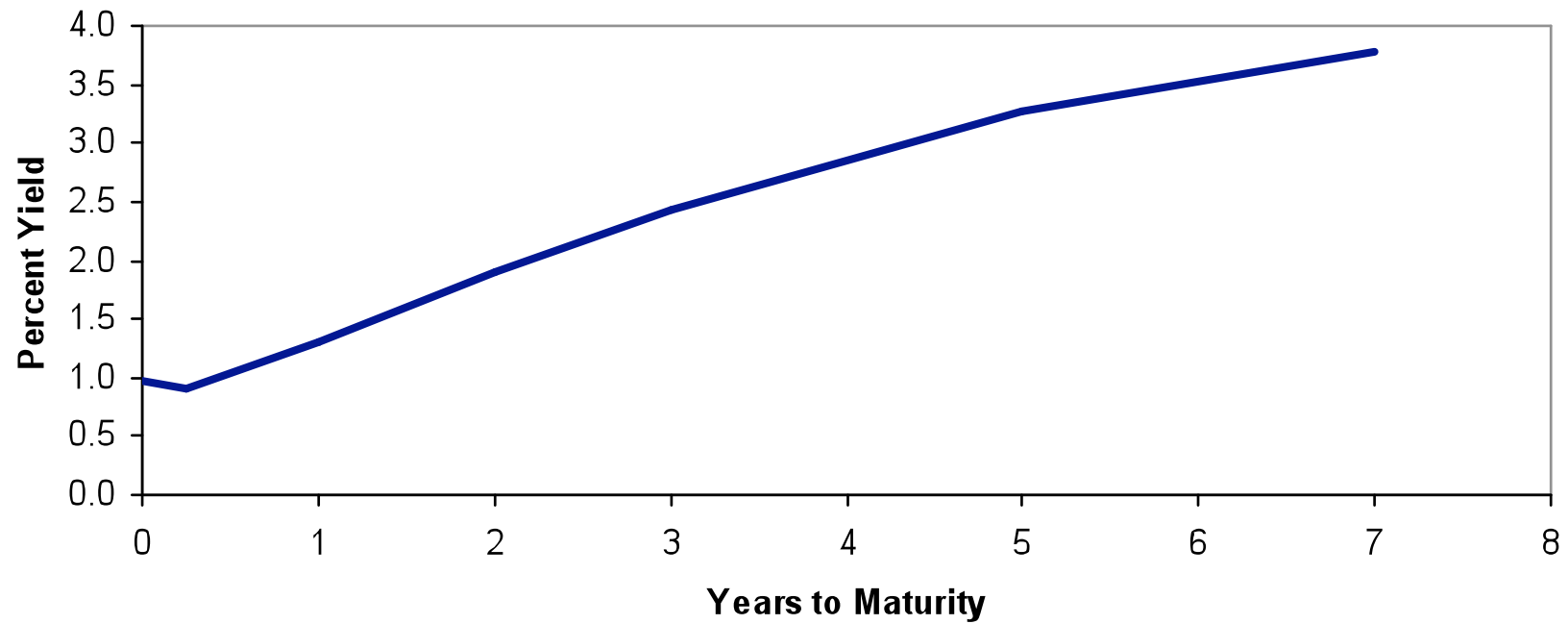
Dec 2006 Term Structure



Open Yale courses

Copyright © 2008 Yale University. Some rights reserved. Unless otherwise indicated on this document or on the Open Yale Courses website, all content is licensed under a Creative Commons License (Attribution-NonCommercial-ShareAlike 3.0).

Dec 2003 Term Structure



Open Yale courses

Copyright © 2008 Yale University. Some rights reserved. Unless otherwise indicated on this document or on the Open Yale Courses website, all content is licensed under a Creative Commons License (Attribution-NonCommercial-ShareAlike 3.0).

Inflation and Interest Rates

- Nominal rate quoted in dollars, real rate quoted market baskets
- Nominal rate usually greater than real rate.

$$(1 + r_{money}) = (1 + r_{real})(1 + i)$$

$$r_{money} \cong r_{real} + i$$

N^o.

1454

STATE of MASSACHUSETTS BAY

The FIRST Day of JANUARY, A. D. 1786:

IN Behalf of the State of Massachusetts Bay, I the Subscriber do hereby promise and oblige Myself and Successors in the Office of TREASURER of said STATE, to pay unto *John Proper* or to his Order, the Sum of *Four hundred & fifty four* pounds.

on or before the FIRST Day of MARCH, in the Year of our Lord One Thousand Seven Hundred and *Eighty four* with Interest at Six per Cent. per Annum: Both Principal and Interest to be paid in the then current Money of said STATE, in a greater or less Sum, according as Five Bushels of CORN, Sixty-eight Pounds and four seventh Parts of a Pound of BEEF, Ten Pounds of SHEEPS WOOL, and Sixteen Pounds of SOLE LEATHER shall then cost, more or less than *One Hundred and Thirty Pounds* current Money, at the then current Prices of said ARTICLES—This Sum being THIRTY TWO TIMES AND AN HALF what the same Quantities of the same Articles would cost at the Prices affixed to them in a Law of this STATE made in the Year of our Lord One Thousand Seven Hundred and Seventy-seven, intituled, "An Act to prevent Monopoly and Oppression." The current Prices of said Articles, and the consequent Value of every Pound of the Sum herein promised, to be determined agreeable to a LAW of this STATE, intituled, "AN ACT to provide for the Security and Payment of the Balances that may appear to be due by Virtue of a Resolution of the GENERAL ASSEMBLY of the Sixth of February One Thousand Seven Hundred and Seventy-nine, to this STATE's Quota of the CONTINENTAL ARMY, agreeable to the Recommendation of CONGRESS, and for Supplying the TREASURY with a Sum of Money for that Purpose."

W. Dawes Committee
R. Cranch

Witness my Hand
H. Gannett Treasurer

Open Yale courses

Copyright © 2008 Yale University. Some rights reserved. Unless otherwise indicated on this document or on the Open Yale Courses website, all content is licensed under a Creative Commons License (Attribution-NonCommercial-ShareAlike 3.0).