

Class #3 Notes
September 10, 2012
Financial Markets and Instruments 3560
Professor Goldstein
Password for solutions: **WAS ON THE BOARD**

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News

- U.S Plans \$18Billion Offering of AIG Stock
- The Journal Report: “How Not to Blow It With Financial Aid”
- Gold climbs to Six-Month High
- Remember to always check the bottom left hand corner of the Money & Investing section (**for this day, it was** on stock buybacks). Usually a short read that provides the reader with useful/important info.
- Interest rates are incredibly low. The U.S government is borrowing money (almost) for free.

Financial Indicators

Dow: 13,302	Euro: 1.28
S&P: 1,436	Gold: 1,738
NASDAQ: 3,131	Oil: 96.42
US 10 Yr Treasury rate: About 1.66%	

Other News:

1. Unemployment currently at 8.1%
2. U.S economy adds 96,000 jobs

Chapter 2 Determinants of Interest Rates

Homework: Ch.2, 1-8, 11, 13-21, 26, 30-32, 35-43

THE FOLLOWING IS THE POWERPOINT SLIDES FROM THIS CHAPTER

Determinants of Interest Rates for Individual Securities

i_j (equilibrium nominal interest rate for a given security) = $f(\text{IP}, \text{RIR}, \text{DRP}_j, \text{LRP}_j, \text{SCP}_j, \text{MP}_j)$

Where,

- Inflation (IP)
 - o $\text{IP} = [(\text{CPI}_{t+1}) - (\text{CPI}_t)] / (\text{CPI}_t) \times (100/1)$
- Real Interest Rate (RIR) and the Fisher effect
 - o $\text{RIR} = i - \text{Expected (IP)}$
- Default Risk Premium (*DRP*)
 - o $\text{DRP}_j = i_{jt} - i_{Tt}$
 - o i_{jt} = interest rate on security j at time t
 - o i_{Tt} = interest rate on similar maturity U.S. Treasury security at time t

- Liquidity Risk (*LRP*)
- Special Provisions (*SCP*)
- Term to Maturity (*MP*)

Unbiased Expectations Theory

- Long-term interest rates are geometric averages of current and expected future short-term interest rates

$${}_1R_N = [(1+{}_1R_1)(1+E({}_2r_1))\dots(1+E({}_Nr_1))]^{1/N} - 1$$

${}_1R_N$ = actual N-period rate today

N = term to maturity, N = 1, 2, ..., 4, ...

${}_1R_1$ = actual current one-year rate today

$E({}_ir_1)$ = expected one-year rates for years, i = 1 to N

Liquidity Premium Theory

- Long-term interest rates are geometric averages of current and expected future short-term interest rates plus liquidity risk premiums that increase with maturity

$${}_1R_N = [(1+{}_1R_1)(1+E({}_2r_1)+L_2)\dots(1+E({}_Nr_1)+L_N)]^{1/N} - 1$$

(NOTE: THIS IS THE BOOK'S NOTATION for this formula, NOT MINE)

L_t = liquidity premium for period t

$L_2 < L_3 < \dots < L_N$

$E({}_1r_2) + \text{premium} = {}_1F_2$

Implied Forward Rates

- A forward rate (*f*) is an expected rate on a short-term security that is to be originated at some point in the future
- The one-year forward rate for any year *N* in the future is:

$${}_Nf_1 = [(1+{}_1R_N)^N / (1+{}_1R_{N-1})^{N-1}] - 1$$

(NOTE: THIS IS THE BOOK'S NOTATION for this formula, NOT MINE)

BACK TO CLASS NOW:

Examples

Nominal vs. Real

- *A \$100 bill is both real and nominal because the bill actually says “\$100” on it and it purchases \$100 worth of goods today. In one year, considering a 5% inflation rate, the \$100 will still be nominal but won't be real since \$100 in one year will not purchase \$100 worth of goods today! In one year, \$105 would be considered real in today's terms because it buys \$100 worth of today's goods.*

Bottle of Water example

I am going to borrow one bottle of water today (worth \$1.00), and will pay back 100% interest in one year's time. Expected inflation is 5%.

$$1+N = (1+R)*(1+ \pi)$$

- R= real rate (the return in goods, *how much can I buy*). e.g. Assuming a 100% interest, I give up one bottle of water today and expect two bottles of water back one year from now.
- N= nominal rate (*how many dollars am I getting*)
- Π = Expected Inflation Rate (not to be confused with 3.14...)

If there was no inflation, I would have to pay \$2.00 (or two bottles of water) next year.

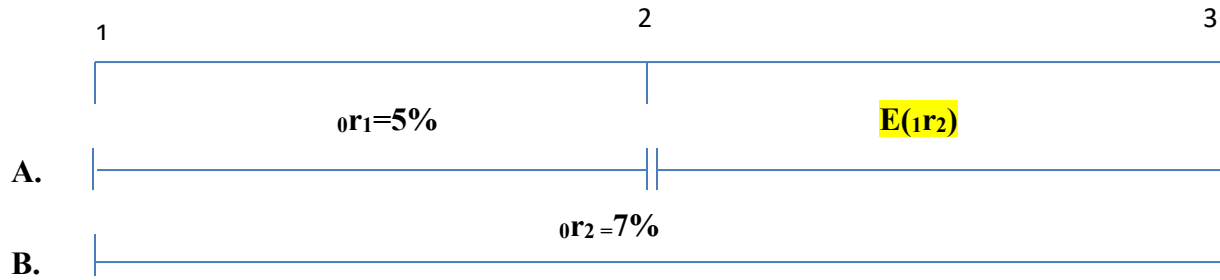
Considering there is a 5% yearly inflation, I have to account for it by paying a total of \$2.10.

This is because in a year, \$2.00 will not be enough to buy the two bottles of water I owe! Each bottle of water will cost \$1.05 in a one year's time. ($\$1.05 * 2 = \2.10)

$$(1+1)*(1+.05) = 2.10$$

Examples on the “Unbiased Expectation Theory”

- Would you rather lock your money for 2 years at 7% interest or for 1 year at 5% and then rollover your earnings and re-invest for another year at the current 1yr interest rate $[E({}_1r_2)]$? **NOTE: YOU DO NOT KNOW THE VALUE FOR $[E({}_1r_2)]$**



Value of your money after two years using method A & B

- A. $100 \cdot (1.05)(1 + E[{}_1r_2])$
- B. $100 \cdot (1.07)^2$

To solve this problem, you have to solve for $({}_1r_2)$. Set “A” and “B” equal to each other, like this:

$$[100 \cdot (1.05) \cdot (1 + E[{}_1r_2])] = [100 \cdot (1.07)^2]$$

$${}_1r_2 = 9.0380952\%$$

Solution: Next year’s expected interest rate for 1yr is equal to 9.0380952% if you hold the Unbiased Expectation’s Theory as true. If you believe that the market will offer a 9.0380952% (or higher) 1yr interest next year, then go for option A. If you believe that the market will not offer interest rates as high as 9.04% then fix your money in for 2 years at 7% with option B.

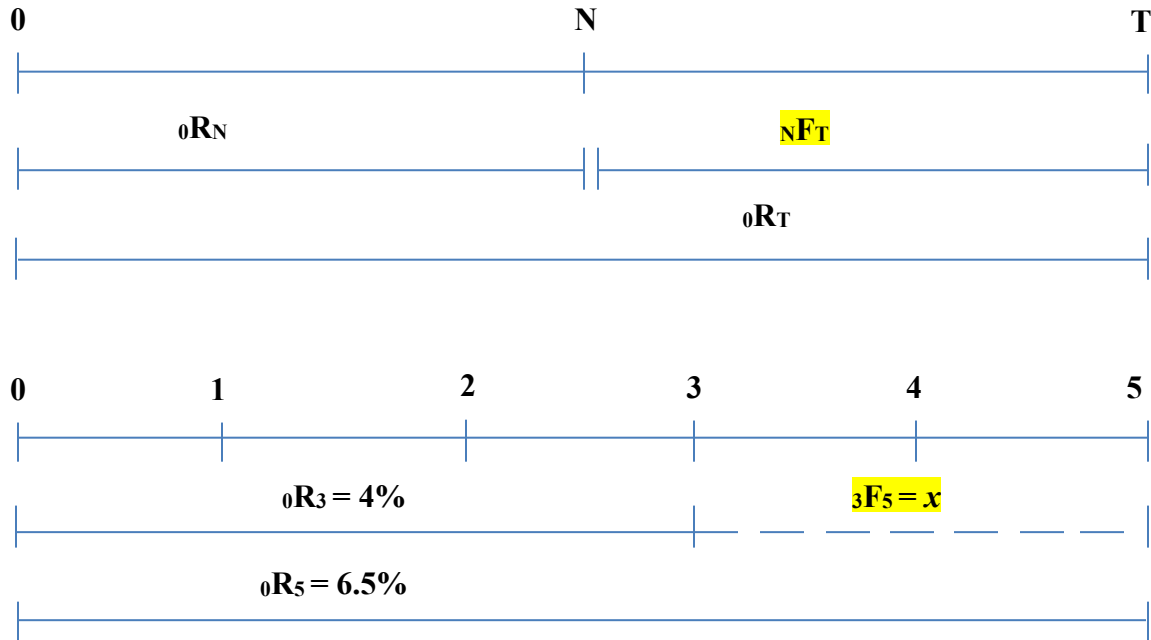
Examples with the Forward Rate

- A rate applicable to a financial transaction that will take place in the future. Forward rates are based on the spot rate, adjusted for the cost of carry and refer to the rate that will be used to deliver a currency, bond or commodity at some future time. It may also refer to the rate fixed for a future financial obligation, such as the interest rate on a loan payment.¹ (Correct, but not the way we are using the terms here. That is what we will mean when we eventually get to the FX chapters.)
- Same formula as Unbiased Theory. Substitute ${}_1r_2$ for ${}_1f_2$

¹ Investopedia

- To avoid making mistakes, use this formula. Diagram explains variables.

$$(1+{}_0R_N)^N * (1+{}_NF_T)^{T-N} = (1+{}_0R_T)^T$$



To find ${}_3F_5$, use the formula...

$$(1+{}_0R_N)^N * (1+{}_NF_T)^{T-N} = (1+{}_0R_T)^T$$

$$(1+.04)^3 * (1+{}_3F_5)^2 = (1+.065)^5$$

$$(1+{}_3F_5)^2 = [(1+.065)^5] / [(1+.04)^3]$$

${}_3F_5 = 10.36\%$ **NOTE: This is NOT enough decimal places. The answer is 10.3631303%**

Additional Notes

A **zero coupon bond** is a debt security that doesn't pay interest (a coupon) but is traded at a deep discount, rendering profit at maturity when the bond is redeemed for its full face value. ²

² Investopedia