

Problem Set 2 (corrected 3/24)

Due *in lecture* on Wednesday, March 26. Be sure to put your name on your problem set. Put “boxes” around your answers to the algebraic questions.

Consider the following data from US Treasury <http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield> (accessed 3/1/2014):

Date	1 Mo	3 Mo	6 Mo	1 Yr	2 Yr	3 Yr	5 Yr	7 Yr	10 Yr	20 Yr	30 Yr
02/03/14	0.04	0.05	0.07	0.11	0.30	0.64	1.44	2.07	2.61	3.29	3.55
02/04/14	0.12	0.06	0.07	0.12	0.31	0.65	1.46	2.09	2.64	3.33	3.59
02/05/14	0.13	0.07	0.07	0.12	0.32	0.66	1.50	2.14	2.70	3.40	3.66
02/06/14	0.07	0.07	0.08	0.13	0.33	0.69	1.52	2.17	2.73	3.42	3.67
02/07/14	0.10	0.08	0.09	0.12	0.30	0.66	1.47	2.13	2.71	3.39	3.67
02/10/14	0.07	0.07	0.10	0.12	0.32	0.66	1.48	2.13	2.70	3.38	3.66
02/11/14	0.05	0.05	0.10	0.12	0.35	0.71	1.54	2.19	2.75	3.42	3.69
02/12/14	0.01	0.05	0.09	0.12	0.35	0.74	1.59	2.23	2.80	3.45	3.72
02/13/14	0.01	0.03	0.08	0.12	0.32	0.70	1.51	2.16	2.73	3.40	3.70
02/14/14	0.01	0.02	0.07	0.11	0.32	0.71	1.53	2.17	2.75	3.41	3.69
02/18/14	0.02	0.05	0.08	0.12	0.31	0.67	1.50	2.14	2.71	3.40	3.68
02/19/14	0.04	0.06	0.09	0.11	0.33	0.69	1.53	2.17	2.73	3.42	3.71
02/20/14	0.02	0.05	0.08	0.12	0.34	0.72	1.57	2.20	2.76	3.44	3.73
02/21/14	0.02	0.05	0.08	0.12	0.33	0.71	1.56	2.19	2.73	3.41	3.69
02/24/14	0.02	0.05	0.08	0.11	0.35	0.72	1.57	2.20	2.75	3.42	3.70
02/25/14	0.04	0.05	0.08	0.11	0.34	0.70	1.53	2.16	2.70	3.37	3.66
02/26/14	0.04	0.05	0.08	0.11	0.33	0.68	1.50	2.12	2.67	3.34	3.63
02/27/14	0.04	0.04	0.07	0.11	0.33	0.68	1.49	2.11	2.65	3.31	3.60
02/28/14	0.04	0.05	0.08	0.12	0.33	0.69	1.51	2.13	2.66	3.31	3.59

Suppose the expectations hypothesis of the term structure holds.

- 1.1 Calculate the expected one year interest rate, one year from 2/28.
- 1.2 Calculate the average of expected one year interest rates for periods 5 and 6 years from 2/28/2014.
- 1.3 Repeat 1.2, using *real* interest rates. Hint: go to <http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=realyield>

2. Asset pricing:

2.1 Calculate the price of a share of stock, assuming dividends are expected to be constant at $D_0 = 1$ and $(rf + rp)$ is also expected to be constant at 0.10. Show your algebraic work.

2.2 Suppose that you revise your expectations regarding $(rf + rp)$ downward by 4 percentage points. What immediately happens to the price of the share of stock? Once again, show your work.

3. News: Suppose the price change of a stock is given by:

$$P_{t+1} - P_t = (E_t P_{t+1} - P_t) + \left[\frac{D_{t+2} - E_t D_{t+2}}{(1 + rp + rf)} + \frac{E_{t+1} P_{t+2} - E_t P_{t+2}}{(1 + rp + rf)} \right]$$

Assume no news regarding dividends is coming out between t and $t+1$.

3.1 Why how might changes in expectations from t to $t+1$ regarding events at $t+4$ have an impact on the price change from t to $t+1$? Be explicit about the channel.

3.2 Should the change in the stock price be a completely uncorrelated random error? Show why or why not.

4. Consider a Bank that has the following balance sheet:

4.1 Suppose the bank has the following structure:

Assets		Liabilities	
Reserves	\$50M	Checkable Deposits	\$230M
Securities	\$25M		
Govt Securities	\$25M		
Loans	\$150M	Bank Capital	\$20M

Bank capital is the equity of the owners (shareholders) of the bank. ABS stands for asset backed securities.

Under the Basel II guidelines, government securities would have zero weight in assets; recalculate the capital ratio for this bank. Show your work. (Note also reserves carry zero weight in the calculation of risk weighted assets.)

4.2 Suppose the government securities are actually as risky as non-government securities. Calculate the true capital ratio.

5. Leverage, liquidity, and bank balance sheets

5.1 Consider two banks, H (high bank capital) and L (low bank capital).

High Bank Capital		Low Bank Capital	
Assets	Liabilities	Assets	Liabilities
Reserves \$9M	Deposits \$90M	Reserves \$10M	Deposits \$96M
Loans \$71M	Bank Capital \$10M	Loans \$70M	Bank Capital \$4M
ABS \$20M		ABS \$20M	

Bank capital is the equity of the owners (shareholders) of the bank. ABS stands for asset backed securities.

Calculate the return on equity (ROE) for each bank, if the rate of return on loans is 5%, and 10% on ABS, and the interest rate on deposits is 2%.

5.2 Show what happens to each of the bank balance sheets when the asset backed securities lose 25% of their value.

5.3 Now consider two banks, one which borrows a **nothing little** short term, and one that borrows a lot on short term money markets.

Bank Deposit Based		Money Market Based	
Assets	Liabilities	Assets	Liabilities
Reserves \$6M	Deposits \$60M	Reserves \$3M	Deposits \$30M
Loans \$74M	Short term \$30M	Loans \$77M borrowing	Short term \$60M borrowing
ABS \$20M	Bank Capital \$10M	ABS \$20M	Bank Capital \$10M

Calculate the return on equity (ROE) for each bank, if the rate of return on loans is 5%, and 10% on ABS, and the interest rate on deposits is 2%, and the interest rate on short term borrowing is 1%.

5.4 Show what each bank must do when short term money markets freeze, so that the banks cannot continue to borrow short term.