

### FINAL EXAMINATION

<b>Course code:</b> SFB13114  <b>ECTS credits:</b> 10	<b>Course:</b> Global Markets and Institutions
<b>Date:</b> 09/12/2019, 09.00 hours	<b>Duration:</b> 4 Hours (written examination)
<b>Allowed aids:</b> Pen, pencils, ruler, simple calculator	<b>Academic responsible:</b> Imtiaz Badshah
<b>Grading:</b> A-F	<b>Attachments:</b> formula sheet
<p><b>The Examination:</b></p> <p>The examination paper consists of 5 pages (including this page) and a Formula sheet (three pages hand written). Please check that the examination papers are complete before you start answering the questions.</p> <p>The school exam entails 5 (five) problems. Each problem comprised of several parts. All problems (and all parts) should be answered/solved.</p> <p><b>Please start</b> answering each problem on a NEW page.</p> <p>Read the text relating to each problem carefully. If something is unclear, you have to make realistic assumptions about how you understand the problem and how you decide to solve the problem. Any such assumptions must be clearly outlined.</p>	
<b>Grading Deadline:</b> 30/12/2019	
<b>LYKKE TIL/ BEST OF LUCK!</b>	

**Problem 1 (20 %)**

**Part A**

Calculate the duration of a \$1,000 6% coupon bond with three years to maturity. Assume that all market interest rates are 7%.

**Solution:**

①

year (1)	Cash Payment (2)	Present value (PV) of Cash Payments $i=7\%$ (3)	weights % of total PV = $\frac{PV}{973.76}$ (4)	weighted Maturity $1 \times 4/100$ (years)
1	60	$56.07 = \frac{60}{1+7\%}$	5.76	0.0576
2	60	$52.41 = \frac{60}{(1+7\%)^2}$	5.38	0.11
3	60	$48.92 = \frac{60}{(1+7\%)^3}$	5.03	0.151
3	1000	$816.3 = \frac{1000}{(1+7\%)^3}$	83.83	2.513
total		973.76	100	2.83

~~2.83~~  
 This bond has duration of 2.83 years. Note that the current price of the bond is \$973.76, which is the sum of the individual "PV of payments".

**Part B,**

If there is a decline in interest rates, which would you rather be holding, long-term bonds or short-term bonds? Why? Which type of bond has the greater interest-rate risk?

**Answer:** You would rather be holding long-term bonds because their price would increase more than the price of the short-term bonds, giving them a higher return.

Part C

What is the expected return on the Exxon-Mobil bond if the return is 12% two-thirds of the time and 8% one-third of the time?

Example  
4.1

$$R^e = P_1 R_1 + P_2 R_2$$
$$= \frac{2}{3} \times (12\%) + \frac{1}{3} (8\%)$$
$$= \frac{2}{3} (12) + \frac{1}{3} (8)$$
$$= 0.08 + 0.027$$
$$= 0.10667$$
$$= \underline{10.667\%}$$

### Problem 2 (20 %)

Part A

What effect would reducing income tax rates have on the interest rates of municipal bonds? Would interest rates of Treasury securities be affected and, if so, how?

**Answer** The reduction in income tax rates would make the tax-exempt privilege for municipal bonds less valuable, and they would be less desirable than taxable Treasury bonds. The resulting decline in the demand for municipal bonds and increase in demand for Treasury bonds would raise interest rates on municipal bonds while causing interest rates on Treasury bonds to fall.

Part B

1-year T-bill rates are expected to steadily increase by 150 basis points per year over the next 6 years. Determine the required interest rate on a 3-year T-bond and a 6-year T-bond if the current 1-year interest rate is 7.5%. Assume that the Pure Expectations Hypothesis for interest rates holds.

Answer

7.10

3-year bond:  
Year 1 interest rate = 7.5%  
Year 2 — — = 9%  
Year 3 — — = 10.5%  
number of years (n) = 3.

$$i_{nt} = \frac{i_t + i_{t+1} + i_{t+2} + \dots + i_{t+(n-1)}}{n}$$
$$i_{3t} = \frac{7.5\% + 9\% + 10.5\%}{3}$$
$$= 27\% / 3 = \underline{\underline{9\%}}$$

6-year Bond  
Year 1 interest rate = 7.5%  
Year 2 — — = 9%  
Year 3 — — = 10.5%  
Year 4 — — = 12%  
Year 5 — — = 13.5%

year 6 interest rate = 15%  
number of years (n) = 6.

$$i_{mt} = \frac{i_t + i_{t+1}^e + i_{t+2}^e + \dots + i_{t+(n-1)}^e}{n}$$

$$i_{6t} = \frac{7.5\% + 9\% + 10.5\% + 12\% + 13.5\% + 15\%}{6}$$

$$= \frac{67.5\%}{6} = \underline{\underline{11.25\%}}$$

Part C

“If stock prices did not follow a random walk, there would be unexploited profit opportunities in the market.” Is this statement true, false, or uncertain? Explain your answer.

**Answer:** True, as an approximation. If large changes in a stock price could be predicted, then the optimal forecast of the stock return would not equal the equilibrium return for that stock. In this case, there would be unexploited profit opportunities in the market and expectations would not be rational. Very small changes in stock prices could be predictable, however, and the optimal forecast of returns would equal the equilibrium return. In this case, an unexploited profit opportunity would not exist.

**Problem 3 (20 %)**

Part A

In what ways can the regional Federal Reserve banks influence the conduct of monetary policy?

**Answer** The Federal Reserve Banks influence the conduct of monetary policy through their administration of the discount facilities at each bank and by having five of their presidents sit on the FOMC, the main policymaking arm of the Fed.

Part B

If the required reserve ratio is 10%, how much of a new \$10,000 deposit can a bank lend? What is the potential impact on the money supply? Recall from introductory macroeconomics that the money multiplier is  $1/(\text{required reserve ratio})$ .

10.5

$$\begin{aligned} \text{New Deposit} &= \$10,000 \\ \text{reserve ratio} &= 10\% \\ \text{reser} &= 10,000 \times 10\% \\ &= \underline{\underline{\$1,000}} \end{aligned}$$
$$\begin{aligned} \text{Bank can lend} &= 10,000 - 1,000 \\ &= \underline{\underline{\$9,000}} \end{aligned}$$

Since the reserve requirement is 10%, the potential money multiplier is  $1/0.1$  or 10. The \$10,000 deposit can potentially increase the money supply by  $\$10,000 \times 10 = \underline{\underline{\$100,000}}$

Part C.

Do you think that the 14-year nonrenewable terms for governors effectively insulate the Board of Governors from political pressure?

**Answer** The 14-year terms do not completely insulate the governors from political influence. The governors know that their bureaucratic power can be reined in by congressional legislation and so must still curry favor with both Congress and the President. Moreover, in order to gain additional power to regulate the financial system, the governors need the support of Congress and the President to pass favorable legislation.

**Problem 4 (20 %)**

Part A

Why do businesses use the money markets?

**Answer** Businesses both invest and borrow in the money markets. They borrow to meet short-term cash flow needs, often by issuing commercial paper. They invest in all types of money market securities as an alternative to holding idle cash balances.

Part B,

The annualized discount rate on a particular money market instrument is 3.75%. The face value is \$200,000 and it matures in 51 days. What is its price? What would be the price if it had 71 days to maturity?

Answer

Handwritten calculations for the price of a money market instrument:

11-11

$$i_{\text{discount}} = \frac{F - P}{F} \times \frac{360}{m}$$
$$3.75\% = \frac{200,000 - P}{200,000} \times \frac{360}{51}$$
$$\frac{0.0375 \times 200,000 \times 51}{360} = 200,000 - P$$
$$1062.5 = 200,000 - P$$
$$\underline{\$198,937.5 = P}$$

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n=71

$$i_{\text{discount}} = \frac{F - P}{F} \times \frac{360}{m}$$
$$3.75\% = \frac{200,000 - P}{200,000} \times \frac{360}{71}$$
$$\underline{\$198,520.83 = P}$$

... 91 days from

Part C

M&E Inc. has an outstanding convertible bond. The bond can be converted into 20 shares of common equity (currently trading at \$52/share). The bond has 5 years of remaining maturity, a \$1,000 par value, and a 6% annual coupon. M&E's straight debt is currently trading to yield 5%. What is the minimum price of the bond?

Answer

1208

$$\text{Debt worth} = \$52 \times 20 = \underline{\$1040}$$
$$\text{PMT} = 1000 \times 6\% = \$60, \quad n = 5, \quad \text{FV} = 1000$$
$$i = 5\%$$
$$\text{PV} = \text{PMT} \left[ \frac{1 - \frac{1}{(1+i)^n}}{i} \right] + \frac{\text{FV}}{(1+i)^n}$$
$$= 60 \left[ \frac{1 - \frac{1}{(1+5\%)^5}}{5\%} \right] + \frac{1000}{(1+5\%)^5}$$
$$= 60 \left[ \frac{1 - \frac{1}{(1.05)^5}}{0.05} \right] + \frac{1000}{(1.05)^5}$$
$$= 259.8 + 783.53$$
$$= \underline{\underline{\$1043.33}}$$



### Problem 5 (20 %)

#### Part A

Identify the cash flows available to an investor in stock. How reliably can these cash flows be estimated? Compare the problem of estimating stock cash flows to estimating bond cash flows. Which security would you predict to be more volatile?

**Answer** There are two cash flows from stock, periodic dividends, and a future sales price. Dividends are frequently changed when firm earnings either rise or fall. The future sales price is also difficult to estimate, since it depends on the dividends that will be paid at some date even farther in the future. Bond cash flows also consist of two parts, periodic interest payments and a final maturity payment. These payments are established in writing at the time the bonds are issued and cannot be changed without the firm defaulting and being subject to bankruptcy. Stock prices tend to be more volatile, since their cash flows are more subject to change.

#### Part B

Consider a 30-year, fixed-rate mortgage for \$100,000 at a nominal rate of 9%. A S&L issues this mortgage on April 1 and retains the mortgage in its portfolio. However, by April 2, mortgage rates have increased to a 9.5% nominal rate. By how much has the value of the mortgage fallen?

Answer

14.5

$$N = 30 \times 12 = 360; \quad i = 9\% / 12 = 0.0075;$$
$$PV = 100,000; \quad PMT = ?$$
$$PV = PMT \left[ \frac{1 - \frac{1}{(1+i)^n}}{i} \right]$$
$$100,000 = PMT \left[ \frac{1 - \frac{1}{(1.0075)^{360}}}{0.0075} \right]$$
$$100,000 = PMT (124.3)$$
$$\$ 804.5 = PMT$$

in a 9.5% market, the mortgage is

$$N = 360; \quad i = \frac{9.5\%}{12} = 0.00792$$
$$PMT = \$804.5; \quad FV = 0; \quad PV = ?$$
$$PV = PMT \left[ \frac{1 - \frac{1}{(1+i)^n}}{i} \right] = 804.5 \left[ \frac{1 - \frac{1}{(1.00792)^{360}}}{0.00792} \right]$$
$$PV = 804.5 (118.9) = \$95,655.1$$

The mortgage value fallen =  $100,000 - 95,655.1 = \$4,344.9$

$\frac{4,344.9}{100,000} = 4.3449\%$