

**GEORGE MASON UNIVERSITY**  
**School of Management**

FNAN 421 **Financial Markets**

Dr. Hanweck

**Sample Final Examination**  
Spring 2004

NAME: \_\_\_\_\_ SSN: \_\_\_\_\_

(Answer all questions. Place your answer to each question on a separate sheet of paper. Please write your name on the top left corner of each page. Document your answers and show your work. Read each question carefully and answer all parts. Try and answer something on each question. Your guess may turn out to be correct. The number in parentheses is the point weight for the question.)

- (15) 1.(a) Discuss various measures of capital market efficiency and how efficient capital markets contribute to the efficiency in the market for goods and services (including productive capital). As part of your discussion, consider the implications of the fact that the bulk of trading in capital markets is in outstanding securities and analyze the meaning of the terms "depth," "breadth," and "resiliency" as descriptions of capital markets. Include in your discussion the types of legislative and regulatory reforms that might be or have recently been instituted in order to improve the efficiency of capital markets and the role of "insider trading" and the SEC as they affect market efficiency.
- (b) Compare money and capital markets and identify the major issuers of securities in the different markets and the difference among the various types of securities within and between each of the markets. Within your discussion of the money markets include a consideration of the role of the Federal Reserve System (Fed) and the banking system as they interact through required reserve maintenance and monetary policy actions by the Fed. Consider in your analysis the types and significance of the links between the money and capital markets via the term structure of interest rates, issuers of debt and equity, or the characteristics of these securities.
- (15) 2. Covered call option writing and protective put option buying are recognized by the investment community for hedging a long stock position. Suppose a money manager holds 100 shares of D-S-9 Corporation at a current price of \$100 and presently not paying a dividend and not anticipated to do so over the next year. The total value of the portfolio is \$10,000. A European call option on 100 shares of D-S-9 with a \$100 strike price that expires in 3 months can be sold for \$700 (call price per share,  $c$ , times 100 shares). Alternatively, a 3-month European put option can be purchased for \$500 (the put price per share,  $p$ , times 100 shares). The risk-free rate,  $r$ , is expected to be 8.16 percent over the life of these options.

**Add Derivagem question.**

Analyze the profit and loss position of the portfolio for the alternative strategies of writing a call or buying a put at the common expiration date:

1. Are the options mispriced according to the theoretical put-call relationship for all prices of the call at expiration?
2. Price of D-S-9 is \$107 or \$112 at expiration?
3. Price of D-S-9 is \$100 at expiration?
4. Price of D-S-9 is \$105 at expiration?
5. Price of D-S-9 is \$102 at expiration?

6. Price of D-S-9 is \$96 at expiration?
7. Price of D-S-9 is \$93 at expiration?

**PUT-CALL Parity in terms of the put option price, p:**

$$p = c + X/(1+r/4) - S$$

where p = the put option price, c = the call option price, X = the strike price, r = the annual risk-free rate,

- (15) 3. Suppose there is a financial asset XYZ, which is the underlying asset for a futures contract with settlement six months from the present. You know the following about this financial asset and this futures contract: in the cash market XYZ is selling for \$80; XYZ pays \$8 per year in two semiannual payments of \$4 and the next semiannual payment is due in exactly 6 months from now; and the current 6-month interest rate at which funds can be loaned or borrowed is 6 percent.
- a. What is the theoretical or equilibrium futures price?
  - b. What action would you, as an investor with the above knowledge, take if the futures price is \$83?
  - c. What action would you, as an investor with the above knowledge, take if the futures price is \$76?
  - d. Suppose that XYZ pays interest quarterly instead of semiannually. If you know that you can reinvest any funds you receive 3 months from now at 1 percent for 3 months, what would the theoretical or equilibrium futures price for 6-month settlement be?
  - e. Suppose that the borrowing rate and lending rate are equal. Instead, suppose that the current 6-month borrowing rate is 8 percent and the 6-month lending rate is 6 percent. What is the boundary conditions for the theoretical or equilibrium futures price?
- (15) 4. Are the following statements consistent or inconsistent? Explain your answer and discuss how equilibrium is achieved between the futures and cash markets.
1. Futures markets serve an important function of the global financial markets by giving investors the opportunity to better manage financial risks associated with their underlying business transactions.
  2. The futures market is where price discovery takes place.
  3. The introduction of futures contracts creates greater price volatility for the underlying commodity or financial asset.
- (15) 5. Suppose the current 90-day yields on 3-month and 6-month T-Bills are 2 and 3 percent, respectively (yields have been converted to 90-day returns for simplicity of calculation).
- (a) In perfectly efficient markets, what yield should you expect to see on a 3-month T-bill futures contract deliverable in 3 months?
  - (b) Show that for the futures yield calculated in (a) the 6-month returns on (i) a 6-month cash bill and (ii) 3-month cash and 3-month futures bills are the same.
  - (c) Explain your results and what factors would lead to a rejection of (b).

NOTE: From the term structure of interest rates recall:

$$(1 + {}_0Y_2)^2 = (1 + {}_0Y_1)(1 + {}_1F_1)$$

where  ${}_0Y_2$  = the cash 6-month bill (two-period) yield,

${}_0Y_1$  = the cash 3-month bill (one-period) yield,

${}_1F_1$  = the 3-month (one-period) forward yield one period from now.

ALSO, in the futures market:

$$(1 + {}_0Y_2)^2 = (1 + {}_0Y_1)(1 + {}_1Y_1^f),$$

where  ${}_1Y_1^f$  = the 3-month futures yield on futures contracts due in three months.

- (15) 6. Consider the following bank balance sheet (fixed rates and pure discount securities unless indicated otherwise). Interest rates on liabilities ( $y_L$ ) are 10 percent and on assets ( $y_A$ ) are 12 percent.

|   | (\$millions) | Duration<br>(years) |
|---|--------------|---------------------|
| Super Now Checking Accounts (rates set daily) | \$100        | 1.0                 |
| 6-Month Certificates of Deposit               | 40           | .5                  |
| 3-Year Certificates of Deposit                | 25           | 3.0                 |
| <b>Total Liabilities</b>                      | <b>165</b>   | <b>?</b>            |
| Net Worth                                     | 10           | ?                   |
| <b>Total Liabilities and Net Worth</b>        | <b>175</b>   | <b>-</b>            |
| Prime-Rate Loans (rates set daily)            | 50           | 1.0                 |
| 2-Year Car Loans                              | 65           | 1.0                 |
| 30-Year Mortgages                             | 60           | 7.0                 |
| <b>Total Assets</b>                           | <b>175</b>   | <b>?</b>            |

- Find the duration of assets and liabilities..
- The bank will (benefit)/(be hurt) if all interest rates rise. Bank management can protect itself by (buying)/(selling) Treasury bond futures contracts. Explain by considering basis risk using interest rate futures to hedge a position with a variety of assets. Define your terms and state clearly your assumptions.
- If the bank gets an additional \$100 million in 6-month certificate of deposit, what investments (using the above portfolio possibilities) should it make to control interest rate risk ( $\Delta y = \pm 200$  basis point change in interest rates) by changing the duration of its portfolio? State the advantages and disadvantages of using net worth immunization and asset/liability duration as a means of controlling interest rate risk. Define your terms.

$$\Delta E = -\Delta y \left[ \frac{D_A}{(1 + y_A)} - \frac{L}{A} \frac{D_L}{(1 + y_L)} \right] A$$

$$D_E \equiv (D_A - \frac{L}{A} D_L) \frac{E}{A}$$

- $\Delta E$  = change in the market value of equity,  
 $D_A$  = duration of assets,  
 $D_L$  = duration of liabilities,  
 $L$  = market value of liabilities,  
 $A$  = market value of assets, and

$\Delta y$  = change in interest rates.

- (10) 7.(a) Within the loanable funds theory, graphically show the effect of an increase in the money supply, assumed to be determined solely by the Fed, on the supply and demand for loanable funds and the equilibrium rate of interest assuming a constant real rate of interest and that people expect inflation to be constant.
- (b) Illustrate and discuss how an autonomous increase in the expected rate of inflation will change the equilibrium nominal interest rate. Consider an initial real rate of interest of 3 percent and an expected inflation rate of 3 percent. If the expected rate of inflation rises to 5 percent with the real interest rate constant, what would the resulting nominal interest rate become, using the Fisher relationship? The rise in the expected rate of inflation is considered to remain at the higher level. Define your terms and discuss a recommended monetary policy to achieve economic stabilization with price stability and an improvement in the balance of payments.
- (c) Starting from an equilibrium position as in 7.a, discuss the effects of the conduct of a more restrictive monetary policy if the markets believe that a Fed tightening will lower future (next period) inflation. How might a recession occur under this scenario?

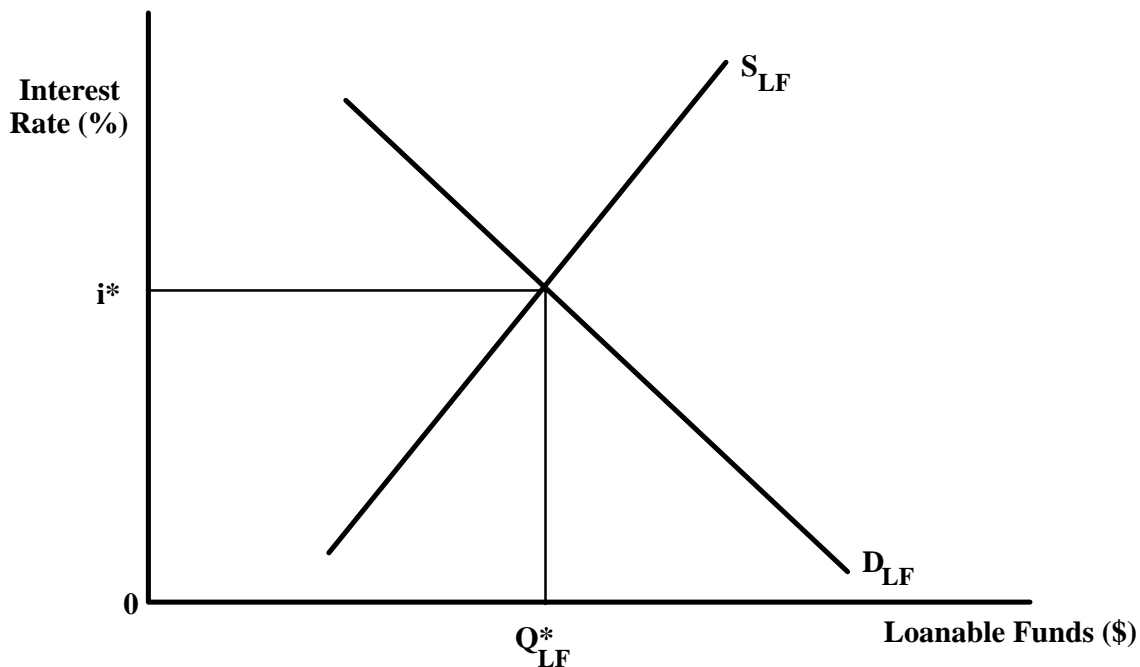
**HINTS:** Recall the Fisher relationship where  $(1+i) = (1+r)(1+p^e)$ , where  $i$  is the nominal interest rate,  $r$  is the required real rate of return before taxes, and  $p^e$  is the expected rate of inflation.

$$D_{LF} = I + G - T + NX \quad I = \text{real investment}; \quad NX = \text{net exports}$$

$$G - T = \text{the government deficit (excess of government spending over tax revenues).}$$

$$S_{LF} = S + \Delta M_S - H \quad S = \text{private savings} \quad H = \text{desired hoarding}$$

$$\Delta M_S = \text{change in the money supply (under Federal Reserve discretionary control).}$$



8. Mortgage markets have developed significantly since the early 1970s through the creation of secondary market instruments in the form of mortgage pass-throughs, collateralized mortgage obligations (CMOs),

and REMICs. These collectively have been generally identified as mortgage backed securities (MBS). In many ways, these instruments carry the characteristics of their underlying assets -- individual mortgages. Study the pricing of mortgage backed securities.