GEORGE MASON UNIVERSITY
School of Management

FNAN 421 Financial Markets Dr. Gerald Hanweck

Sample Midterm Examination

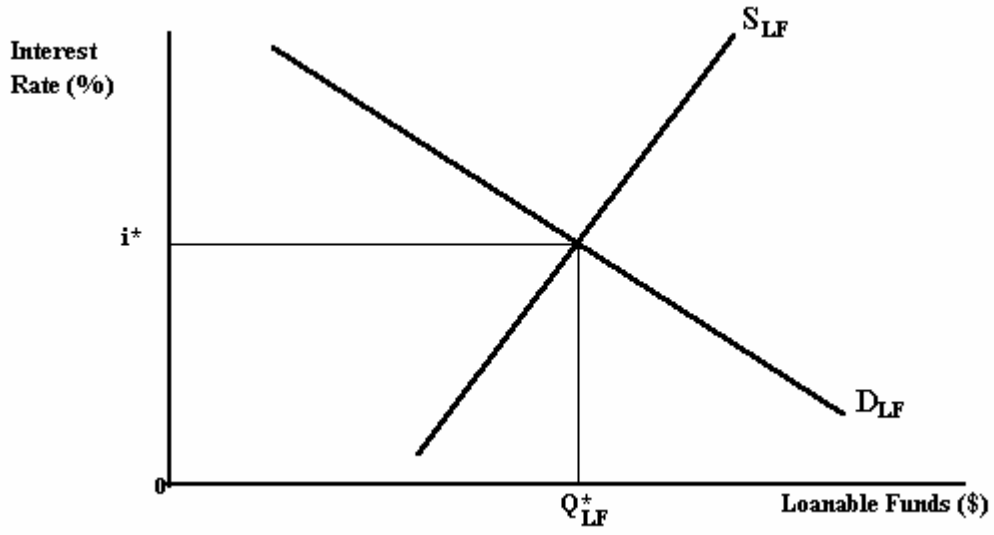
NAME: _____ SSN: _____

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

(15) 1(a). What are the economic functions that financial intermediaries and markets perform that benefit society? In your answer, discuss the relationships of financial intermediaries and financial markets to the savings-investment process within an economy and to each other. In addition, provide in your discussion an analysis of the differences in preferences among economic agents as an explanation for the wide variety of primary and secondary securities found in financial markets and the reasons for federal and state regulation of depository institutions and other financial intermediaries. In this regard, consider what role asset-backed securities, securitization and the secondary markets for these instruments play in the efficiency of the financial intermediation process. For example, the mortgage-backed securities secondary markets' development and the funds flows to finance home ownership. In this discussion consider the role of interest rates in determining the demand for current and future consumption and the relationship of this to individual and aggregate saving.

(10) 1(b) 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.

(25) 2. Using the graph below of the supply of loanable funds, S_{LF}, and the demand for loanable funds, D_{LF}, discuss the following:



a. What is meant by the equilibrium rate of interest?

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.

c. Starting from an equilibrium position as in 2.a, discuss the effects of a tightening 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.

$D_{LF} = I + G - T + NX$ I = investment in real assets; NX = net exports
G - T = the government deficit (excess of government spending over tax revenues).
$S_{LF} = S + \Delta M_S - H$ S = private savings H = desired hoarding
ΔM_S = change in the money supply (under Federal Reserve discretionary control).

(25) 3(a). Discuss the relationship of a coupon bond's price, duration, and convexity of the price-yield relationship with respect to changes in the bond's maturity, coupon, and yield to maturity. Define your terms, state assumptions, and clearly identify the algebraic sign (positive or negative) in the relationships discussed.

3(b) Compare the interest rate risk of a noncallable 10-year Treasury coupon bearing bond with a mortgage-backed pass-through security with prepayments related to the level of interest rates – lower market interest rates raise the rate of prepayments. Discuss how the changes in cash flows from a mortgage-backed security affect the duration of such securities. HINT: consider the coupon effect on duration.

3(c). In terms of the following three empirical tendencies, discuss how they are related to the concept of duration or sensitivity of the value of a security (or portfolio) to a change in market yields, and to the need that certain investors might have for the securing of a minimum yield over specified holding period (H), or portfolio immunization. In your analysis, discuss the concept that an immunized portfolio, under some specific simplifying assumptions, has a duration equal to the investor's desired holding period. Consider the duration of a zero coupon bond in your discussion of immunization.

Empirical Tendency 1: A given change in yield to maturity affects the prices and rates of return of long-term more than short-term securities.

Empirical Tendency 2: Short-term yields normally fluctuate more widely than long-term yields.

The third tendency may be considered as the net effect of the first two tendencies.

Empirical Tendency 3: Although long-term yields tend to vary less than short-term yields, the greater sensitivity of long-term prices to yield changes normally dominates relative price movements. That is, the prices of longer term securities normally undergo much greater changes than the prices of short terms so that investors in long-term securities enjoy greater gains when yields fall and suffer greater losses when yields rise than do the holders of short-term securities.

Macaulay Duration Measure:

$$D_M = \frac{\partial P}{\partial y}\frac{(1+y)}{P}, \quad For\ a\ bond: D_M = \frac{\sum_{t=1}^{M}\frac{tC}{(1+y)^t} + \frac{MF}{(1+y)^M}}{\sum_{t=1}^{M}\frac{C}{(1+y)^t} + \frac{F}{(1+y)^M}}$$

A more complete approximation to the proportional change in price of a bond with respect to a change in yield to maturity takes into account the convexity of the price-yield relationship for the bond:

$$\frac{dP}{P} = \frac{\partial P}{\partial y}\frac{1}{P}dy + \frac{1}{2}\frac{\partial^2 P}{\partial y^2}\frac{1}{P}dy^2$$

where P = Price, C = coupon, F = Face value, y = Yield to maturity, M = maturity (years), t = time (year), dP is the total change in price, and $\frac{\partial P}{\partial y}$ is the partial change in price with respect to a change in yield to maturity. The second term, excluding the dy^2, is the convexity effect.

(25) **4**. There are a number of theories of the term structure of interest rates including the pure expectations hypothesis, preferred habitat hypothesis, and market segmentation hypothesis. Discuss the implications of the expectations hypothesis within the context of the following problem. **Problem 1:** For a two-year, default-free, pure discount security, compute its yield to maturity and draw the respective yield curves assuming two different expectations of inflation employing the Fisher Effect: **(a)** 5 percent one year from now, and **(b)** 7 percent one year from now. In addition, define and compute the implied forward yield on a one-year security one year from now, assuming the current two-year yield is 7.5 percent. Discuss the assumptions underlying this calculation and how it can be used to evaluate the implied forward yield on a 1-year loan, next year. What is the implied expected rate of inflation if the real rate remains at 3 percent?

Use the following definitions and values:

	r	=	0.03 (constant real rate of interest)
	p_1	=	0.02 (period 1 rate of inflation)
(a)	p_2^e	=	0.05 (expected period 2 rate of inflation)
(b)	p_2^e	=	0.07 (expected period 2 rate of inflation)
	${}_1y_1$	=	current yield on one-year securities
	${}_2y_1^e$	=	Expected period 2 yield on one-year securities
	${}_1y_2$	=	current yield on two-year securities

Unbiased Expectations Hypothesis

In generals, $(1 + {}_1y_m) = [(1 + {}_1y_1)(1 + {}_2y_1^e)\ldots(1 + {}_my_1^e)]^{1/m}$ and ${}_jy_1^e$ = the forward rate, ${}_jf_1$.

Fisher Relationship: $(1 + {}_jy_1) = (1 + {}_jr_1)(1 + {}_jp_1^e)$, where ${}_jp_1^e$ is the expected rate of inflation for period j for 1 year, and ${}_jr_1$ is the real rate of interest for period j for 1 year.

Specifically, $(1 + {}_1y_2) = [(1 + {}_1y_1)(1 + {}_2y_1^e)]^{1/2}$ and ${}_2y_1^e$ = the forward rate, ${}_2f_1$.

The expected future 1-year yield factor is: $1+{}_2y_1^e = \frac{(1+{}_1y_2)^2}{(1+{}_1y_1)}$.

Problem 4.c: Draw the yield curves under assumptions (a) and (b) concerning the expected rates of inflation. Give the reasons for the shapes of these yield curves (**HINT:** are forward rates on future short-term securities equal to, greater than, or less than current short-term interest rates).

(15) 5. 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.

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?

a. Price of D-S-9 is $107 or $112 at expiration?

b. Price of D-S-9 is $100 at expiration?

c. Price of D-S-9 is $102 at expiration?

d. 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 and S = the stock price.

(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 (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
Total Liabilities	**165**	**?**
Net Worth	10	**?**
Total Liabilities and Net Worth	**175**	-
Prime-Rate Loans (rates set daily)	50	1.0
2-Year Auto Loans	65	1.0
30-Year Mortgages	60	7.0
Total Assets	**175**	**?**

a. Find the duration of assets and liabilities.

b. 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.

c. If the bank gets an additional $100 million in 2-Year Auto Loans, how should this addition in loans be funded (using the above portfolio possibilities) to better control interest rate risk ($\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.

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

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

ΔE	=	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
Δy	=	change in interest rates.