2019 EXAMINATIONS

PART II **(SECOND AND FINAL YEAR)**

ACCOUNTING AND FINANCE

AcF 321 **INVESTMENTS**

(2 hours + 15 minutes reading time)

Answer any **THREE** questions.

For each question, please write your answers in a separate booklet.

The use of standard calculators with scientific, and standard arithmetic and statistical functions, is permitted.

QUESTION 1
ANSWER ALL PARTS OF THE QUESTION

a. Explain how the CAPM beta of a stock is estimated.

[3 marks]

b. Do betas of a share estimated using intraday, daily and monthly returns generally differ? Explain briefly.

[5 marks]

c. Explain the assumptions and implications of the "One Fund Separation" theorem.

[7 marks]

d. You have been researching an AAA (ie very low risk of default) 10-year corporate bond which you believe is trading cheaply. You expect the bond to have a return of 7.5% per annum, while the comparable 10-year Treasury bond has an expected return of 6%. The annual volatility of the corporate bond is 6.5% and that of the Treasury bond is 6%; the correlation between them is 0.95. You can borrow or lend short term at the Treasury bill rate of 5.4%.

Required:

(i) Supposing that you want to construct a levered portfolio consisting of the corporate bond and the treasury bond, design the portfolio that has an expected return of 40% and minimum risk.

[12 marks]

(ii) What is the volatility of the optimal portfolio?

[3 marks]

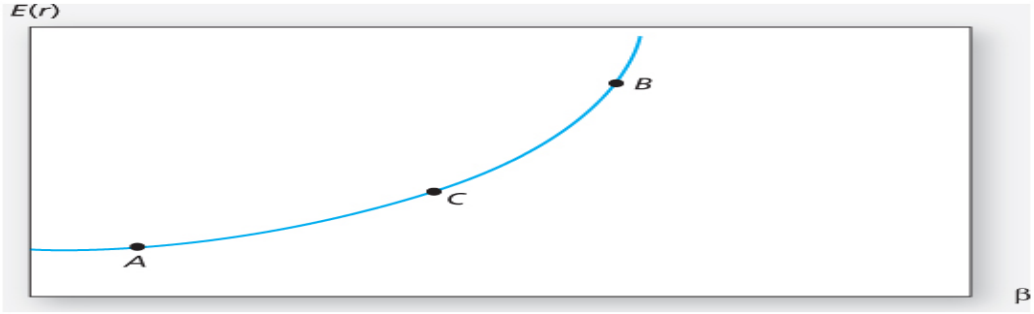
(iii) If the correlation between the corporate and treasury bonds turns out to be 0.8 rather than the 0.95 you had assumed, and the portfolio composition is as estimated in (i), would you expect the volatility of the portfolio to be different from your answer in (ii)? Explain briefly.

[3 marks]

TOTAL 33 MARKS

QUESTION 2
ANSWER ALL PARTS OF THE QUESTION

a. Suppose the relationship between expected return and beta is as shown below:



Required:

(i) According to CAPM, is there an arbitrage opportunity? Justify your answer.

[4 marks]

(ii) Some researchers have examined the relationship between average returns on diversified portfolios and the β and β^2 of those portfolios. What should they have discovered about the effect of β^2 on portfolio return?

[4 marks]

b. Discuss the empirical performance of CAPM (as presented in Fama and French, 2004). [1] Your explanation should include the main reasons for this performance.

[8 marks]

c. Assume that the stock market returns have the market index as a common factor, and that all stocks in the economy have a beta of 1 on the market index. Firm-specific returns all have a standard deviation of 30%. Suppose that an analyst studies 20 stocks, and finds that one-half have an alpha of 2%, and the other half an alpha of -2%. Suppose the analyst buys $1 million of an equally weighted portfolio of positive alphas, and shorts $1 million of an equally weighted portfolio of the negative alpha stocks.

Required:

(i) What is the expected profit (in dollars) and standard deviation of the analyst's profit?

[6 marks]

(ii) How does your answer change if the analyst examines 100 stocks instead of 20 stocks?

[4 marks]

d. Describe the Fama-French three-factor model. Your answer should include a discussion of the risk factors and the factor loadings associated with the model.

[7 marks]

TOTAL 33 MARKS

[1] Fama, Eugene F., and Kenneth R. French. 2004. "The Capital Asset Pricing Model: Theory and Evidence." Journal of Economic Perspectives, 18(3): 25–46.

QUESTION 3
ANSWER ALL PARTS OF THE QUESTION

a. Explain how the 'Joint Hypothesis' problem would affect your interpretation of the empirical evidence relating to market efficiency.

[3 marks]

b. Explain Synchronization Risk and discuss how the evidence presented in Brunnermeier and Nagel (2004)[2] relates to it.

[5 marks]

c. Explain the Grossman-Stiglitz paradox.

[3 marks]

d. A portfolio *P* is invested in two assets *A* and *B*, with the remainder being invested in the market *M*. The diversifiable components of *A* and *B* are uncorrelated with each other. Over the last year, you have the following statistics, where *T* denotes T-bills in which the portfolio was not invested:

	A	*B*	*M*	*T*
Return	8.8%	9.6%	9.0%	4.4%
Beta	0.90	1.10	1.00	
Standard Deviation	22.0%	25.4%	20.0%	
Portfolio weight	14.0%	7.5%	78.5%	

Required:

(i) Compute the Jensen measure for each asset and for the portfolio as a whole

[3 marks]

(ii) Calculate the idiosyncratic standard deviation for both *A* and *B*.

[3 marks]

(iii) Calculate the portfolio's beta, total standard deviation and idiosyncratic standard deviation. **[6 marks]**

(iv) Calculate the Sharpe ratio of the portfolio and of the market.

[3 marks]

e. An equity fund has £100m under management at the beginning of the year. The following table shows the cash inflows (positive) and cash outflows (negative) that occur at the end of each of the two years.

	Year 1	Year 2
Cash Flow (£m)	20	0
Fund value *after* addition of cash flow (£m)	135	120

[2] Brunnermeier, Markus K. and Nagel, Stefan. "Hedge Funds and the Technology Bubble." Journal of Finance, 2004, 59(5), pp. 2013

Calculate the time-weighted and value-weighted rates of return on the fund. Under what circumstances would each measure be an appropriate estimate of an average rate of return?

[4 marks]

f. Explain market-timing of portfolio returns. How would you test for it?

[3 marks]

TOTAL 33 MARKS

QUESTION 4
ANSWER ALL PARTS OF THE QUESTION

a. What is the difference between the duration of a bond and its maturity? Give an example of a bond that has a very short duration and a very long maturity.

[3 marks]

b. Explain the difference between a bond's dirty and clean price.

[3 marks]

c. Prices, coupon rates (paid annually) and maturities of three comparable Treasury bonds, as of May 16, 2019, are listed below:

Bond	*Price($)*
6% of 05/15/2020	102.00
6% of 05/15/2021	100.00
10% of 05/15/2022	105.00

Required:

(i) Calculate all spot rates implicit in these prices.

[6 marks]

(ii) What is the expected one-year spot rate after one year assuming that the expectations theory of term structure is correct?

[3 marks]

(iii) Based on the spot rates you have calculated, is there an arbitrage opportunity if a 12% coupon (paid annually) bond maturing in 3 years is priced at $115? Explain.

[5 marks]

d. A 12.75-year maturity zero-coupon bond selling at an YTM of 8% has convexity of 150.3 and modified duration of 11.81 years. A 30-year maturity 6% coupon bond making annual coupon payments also selling at an YTM of 8% has nearly identical duration – 11.79 – but considerably higher convexity of 231.2.

Required:

(i) Suppose YTM on both bonds increases to 9%. What will be the actual percentage capital loss on each bond? What percentage capital loss would be predicted (using duration and convexity)?

[5 marks]

(ii) Repeat part (a), but this time assume YTM decreases to 7%.

[5 marks]

(iii) Do you think it would be possible for two bonds to be priced initially at the same YTM? Explain.

[3 marks]

TOTAL 33 MARKS

QUESTION 5
ANSWER ALL PARTS OF THE QUESTION

a. Explain the relationship between convenience yields and the term structure of crude-oil futures prices. How is it related to "rollover risk" in the futures market, as illustrated in the case of Metallgesellschaft AG?

[9 marks]

b. Suppose the 1-year futures price on a stock-index is 1,218, the stock index is currently is 1,200, the 1-year risk-free interest is 3%, and the year-end dividend that will be paid on a 1,200 investment in the market index portfolio is $15.

Required:

(i) What should be the price of the contract?

[2 marks]

(ii) Formulate a zero-net-investment arbitrage portfolio and show that you can lock in riskless profits equal to the futures mispricing.

[4 marks]

(iii) Now assume that if you short sell the stocks in the market index, the proceeds of the short sale are kept with the broker, and you do not receive any interest income on the funds. Is there still an arbitrage opportunity? Explain.

[4 marks]

(iv) Given the short-sale rules, what is the no-arbitrage band for the stock-futures price relationship?

[6 marks]

c. Explain the main advantages and disadvantages of market-neutral/long-short strategies.

[8 marks]

TOTAL 33 MARKS

END OF PAPER